IT FOR MANAGERS LABORATORY
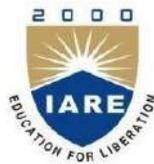
LAB MANUAL

Academic Year : **2019 - 2020**
Subject Code : **CMBB13**
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Class : **I Semester (MBA)**

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Vision
To excel in management education and research by nurturing the youth to become global management leaders.

Mission
We intend to empower the capabilities of the young managers to face various challenges in the global community by raising their acquired skills and knowledge.   In pursuit of excellence, we provide training and development activities, cultivate research skills, enhance entrepreneurship abilities and offer employability in multi-domain business organizations.

Quality Policy
Our policy is to nurture and build diligent and dedicated community of engineers providing a professional and unprejudiced environment, thus justifying the purpose of teaching and satisfying the stake holders.   A team of well qualified and experienced professionals ensure quality education with its practical application in all areas of the Institute.

Philosophy
The essence of learning lies in pursuing the truth that liberates one from the darkness of ignorance and Institute of Aeronautical Engineering firmly believes that education is for liberation.

Contained therein is the notion that engineering education includes all fields of science that plays a pivotal role in the development of world-wide community contributing to the progress of civilization. This institute, adhering to the above understanding, is committed to the development of science and technology in congruence with the natural environs. It lays great emphasis on intensive research and education that blends professional skills and high moral standards with a sense of individuality and humanity. We thus promote ties with local communities and encourage transnational interactions in order to be socially accountable. This accelerates the process of transfiguring the students into complete human beings making the learning process relevant to life, instilling in them a sense of courtesy and responsibility. |

Program Outcomes (POs)	
PO1	**Managerial Skills**: Apply knowledge of management theories and practices to solve business problems.
PO2	**Decision making Skills**: Foster analytical and critical thinking abilities for data-based decision making.
PO3	**Ethics**: Ability to develop value based leadership ability.
PO4	**Communication Skills**: Ability to understand, analyze and communicate global, economic, legal, and ethical aspects of business.
PO5	**Leadership Skills**: Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment.
PO6	**Entrepreneurial and Innovation Skills**: Demonstrate the skills in evaluating business opportunity and identifying sources of potential funding, and develop as successful entrepreneurs.
PO7	**Strategic Skills**: Analyze and formulate managerial strategies to sustain in dynamic global business environment.
PO8	**Technology Skills**: Inculcate and develop technical skills to face the competitive world successfully.
Program Educational Objectives (PEOs)	
PEO1	To impart adequate knowledge of management theories and concepts to enhance research and learning for continuous growth and development.
PEO2	To provide the learners with exposure to solve business situations using management tools, to analyze and create newer opportunities in industry.
PEO3	To achieve appropriate communication skills and higher levels of proficiency for successful career in Industry, Business and Entrepreneurship.
PEO4	To demonstrate the ability to maintain knowledge of emerging technologies to address the critical needs of the seamless strategic business operations.

ATTAINMENT OF PROGRAM OUTCOMES
&
PROGRAM SPECIFIC OUTCOMES

Exp. No	Experiment	Program Outcomes Attained
1	INTRODUCTION OF INFORMATION TECHNOLOGY	PO2
2	ROLE OF INFORMATION SYSTEMS	PO2
3	INTRODUCTION TO MS EXCEL	PO2
4	BASICS OF MS EXCEL	PO5
5	VARIOUS FORMATTING STYLES IN MS EXCEL	PO5
6	WORKING WITH TEXT AND LOOKUP FUNCTIONS	PO7
7	WORKING WITH FUNCTIONS	PO5
8	DATA ANALYSIS WITH MS EXCEL	PO7
9	CREATION OF VARIOUS CHARTS IN MSEXCEL	PO5
10	LaTeX FORMATTING	PO8
11	VARIOUS FORMATTING STYLES IN LaTeX	PO8
12	GRAPHICS AND TABLES IN LaTeX	PO8

LIST OF EXPERIMENTS

WEEK-1	**INTRODUCTION OF INFORMATION TECHNOLOGY**

Introduction to Information Technology and Information Systems

WEEK-2	**ROLE OF INFORMATION SYSTEMS**

Role of Information Systems in an organization and Decision Support Systems (DSS)

WEEK-3	**INTRODUCTION TO MS EXCEL**

MS Excel as Spreadsheet based DSS - Features of MS Excel, Uses of MS Excel.

WEEK-4	**BASICS OF MS EXCEL**

Spreadsheet Orientation: Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

WEEK-5	**VARIOUS FORMATTING STYLES IN MS EXCEL**

Calculating GPA - Features to be covered:- Cell Referencing, Formulae in spreadsheet – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, Sorting, Conditional formatting.

WEEK-6	**WORKING WITH TEXT AND LOOKUP FUNCTIONS**

Create a spreadsheet by using the following functions : Text Functions, Lookup Functions.

WEEK-7	**WORKING WITH FUNCTIONS**

Create a spreadsheet by using the following functions : Date and Time Functions, Math and Statistical Functions, Database Functions.

WEEK-8	**DATA ANALYSIS WITH MS EXCEL**

Create a spread sheet document by using data analysis concept with what - if Analysis - Data Tables, Scenario Manager, Goal Seek.

WEEK-9	**CREATION OF VARIOUS CHARTS IN MSEXCEL**

Apply data analysis concept for creating Pivot Tables and Pivot Charts.

WEEK-10	**LaTeX FORMATTING**

Introduction of LaTex and LateX document formatting:

Create a LaTeX document with following formatting: All margins with 1.5, headings with bold, text with normal, chapter name with blue color, line space with 1.5.

WEEK-11	**VARIOUS FORMATTING STYLES IN LaTeX**

Using LaTeX to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX.

WEEK-12	**GRAPHICS AND TABLES IN LaTeX**

Create a LaTeX documents with images and image caption at centre alignment, table with thick border and table caption with centre alignment, row height, content with cell centre alignment.

Text Books:

1. Gross Debra, "Succeeding in Business with Microsoft Excel - 2013: A Problem Solving Approach", Cengage Learning, 1st Edition, 2014.

REFERENCE BOOKS:

1. Paul Mcfedries, "Excel 2013 Formulas and Functions", Pearson Education, , 1st Edition,2013.
2. Dodge Mark, Stinson Craig, "Microsoft Excel 2013 Inside Out", Prentice Hall of India, 1st Edition, 2013.
3. Guy Hart Davis, How to do everything with Microsoft Office Excel, Tata McGraw Hill, Revised 1st Edition, 2010.
4. Lisa Miller, "MIS Cases: Decision Making with Application Software", Pearson Education, Revised 1st Edition, 2011.
5. Giridhar Joshi, "Management Information Systems", Oxford University Press, Revised 1st Edition, 2013.

WEB REFERENCES:

1. http://www.abebooks.com/servlet/SearchResults?isbn.pdf.
2. http://www.amazon.in/Succeeding-Business-Microsoft-Excel-2013
3. http://ctan.org/pkg/bibtopic

E-Text Books:

1. http://www. http://www.chegg.com/textbooks/succeeding-in-business
2. http://www.cengage.com.au/product/title/succeeding-in.

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WEEK-1

Introduction of Information Technology
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An Overview of Computer Systems

Introduction:

Computer systems are extremely complex objects. Even the smallest systems consist of millions of individual parts. Each part is relatively simple in its function and easy to understand. It is only when these millions of simple parts interact with each other that we develop the complex structures that comprise our modern computing systems. In this lesson, we take a brief look at the major components of a computing system. In subsequent lessons, we will study each component in more detail.

Data and information processing have been previously defined as the transformation of un organized raw material or data into useful information. This processing may be done manually or with the help of mechanical and electronic devices. It is common to refer to the collection of personnel, equipment, software, and procedures that perform the data and information processing functions as an information processing system. Very often, when a computer is used, the system is referred to as a computer system. We will use the term computer system to refer to the hardware and software exclusively, and reserve the term information processing system to include the people and procedures. In the early days of computing, when the computer was used simply to replace manual operations such as payroll, the term that was used was EDP, or electronic data processing system.

In the future we will continue to build computers out of these three logical components but the electronic implementation will change. Systems will still include people, machines, software, and procedures, although our techniques for defining them will become more rigorous. As you read through the following material, try to distinguish those concepts that are apt to change substantially and those that will not.

The Hardware (Equipment)

Hardware can be categorized in numerous ways. Below we will look at the central unit, or central processing unit (CPU), and the associated equipment consisting of auxiliary storage, input and output devices, and communication devices. All of the units that are connected to the central processing unit are called peripheral devices.

Motherboard

The motherboard is the main component of a computer. It is a board with integrated circuitry that connects the other parts of the computer including the CPU, the RAM, the disk drives (CD, DVD, hard disk, or any others) as well as any peripherals connected via the ports or the expansion slots.

Expansion cards

An expansion card in computing is a printed circuit board that can be inserted into an expansion slot of a computer motherboard or backplane to add functionality to a computer system via the expansion bus. Expansions cards can be used to obtain or expand on features not offered by the motherboard.

Central Processing Unit

The part of the computer system that performs the logic transformations on the data and controls all the other devices is the central processing unit, or CPU. The CPU interprets and executes the program instructions. It has three main components: the arithmetic-logic unit (ALU), the control unit, and the primary storage unit. In many personal computers, the ALU and control unit are fabricated as a single component on a single silicon chip with the primary storage on separate.

Auxiliary Storage Devices

In today's modern computing systems, it is necessary to have another form of memory. It is often the case that the main memory is not large enough to accommodate all the data necessary for a particular application. It is also the case that main memory is only used to hold data that are currently being processed. When not in use, data are stored on auxiliary storage devices. Auxiliary storage devices (sometimes called secondary storage) can overcome this difficulty. The most common devices used are magnetic disk drives, CDs or magnetic tapes used for backups. Many personal computers still use a flexible disk called a floppy. Common memory sizes for personal.

Classification of Computer Systems

Any classification of computer systems is an ephemeral thing. It will be at least a year from the time this lesson was first typed to the time you are reading it in class. In that time, some of the physical classificationsthatwehavedevisedwillbeoutdated.

Mainframes

The term most commonly used for the largest general purpose computing system is a mainframe computer. The cost ranges from several hundred thousand to several million dollars. This cost has stayed relatively constant since the early 1950s; however, the power mainframes. of the mainframe has increased dramatically.

Mainframe systems are designed for large-scale scientific and commercial applications. Their scientific applications range from long-range weather forecasting to the analysis of complex data from high energy nuclear physics experiments. Typical commercial applications are the very complex airline reservation systems and massive banking systems.

Minicomputers

Originally, the mini had very limited memory and a single logic unit. The most attractive thing about it was its cost. Relatively inexpensive computing capacity couldbe purchased with a mini, so management was willing to buy these systems for specialized purposes such as process control. Today the capacity of many of the minis found in industry rivals the mainframes of a few years ago. Many of the applications that were exclusively run on the mainframes are being done on minis and

the distinction between the two systems, mainframe and mini, has become clouded.

Microcomputers

Microcomputers are widely used as personal workstations in almost all aspects of business, industry, and government. They are found extensively in the home and in educational institutions. Although there are microcomputer systems that are capable of serving several users at once, most are used by one person. This has led to the term personal computer (PC), which is used interchangeably with the term micro. Among the most popular micro computers are those produced by IBM, Apple, and Tandy-Radio Shack. An entire industry has developed manufacturing PCs that function identically to the IBM PC. These machines are often called PC clones. In 1987 IBM introduced its next generation of PCs, the Personal System 2. It is a family of products that significantly increases the power of the earlier machines.

Supercomputers

One additional category of computing systems we have not discussed is commonly referred to as the supercomputer. These systems have extremely large memories and are very fast. They cost in the range of millions dollars. They are most commonly used for very large computational problems. These systems are so complex that they usually have a mainframe computer that functions as the input and output device for the supercomputer. A good definition of a supercomputer is simply the largest and most powerful computer that is available at the present time. Supercomputers have found application in long-range weather forecasting and other very complex problems that require enormous amounts of computation. Manufacturers of the largest supercomputers are Cray Research and Control Data Corporation.

- The BIOS (basic input/output system) gets the computer system started after you turn it on and manages the data flow between the operating system and attached devices such as the hard disk, video adapter, keyboard, mouse, and printer.

- The boot program loads the operating system into the computer's main memory or random access memory(RAM).

- An assembler takes basic computer instructions and converts them into a pattern of bits that the computer's processor can use to perform its basic operations.

- A device driver controls a particular type of device that is attached to your computer, such as a keyboard or a mouse. The driver program converts the more general input/output instructions of the operating system to messages that the device type can understand.

Computer Software: Software is a set of programs, which is designed to perform a well- defined function. A program is a sequence of instructions written to solve a particular problem.

There are two types of software −

- System Software
- Application Software

System Software

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users.

Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.
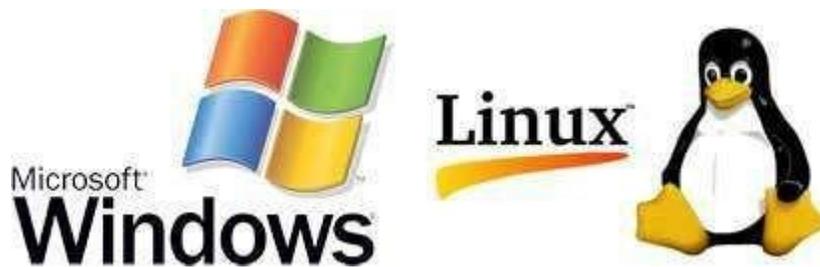
Here is a list of some of the most prominent features of a system software:

- Close to the system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate
- Generally written in low-level language

Application Software

Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Application software may consist of a single program, such as Microsoft's notepad for writing and editing a simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Examples of Application software are the following :

- Payroll Software
- Student Record Software
- Inventory Management Software
- Income Tax Software
- Railways Reservation Software
- Microsoft Office Suite Software
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

Features of application software are as follows:

- Close to the user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

Information Technology and Business

An **Information System** (**IS**) is an organized system for the collection, organization, storage and communication of information. More specifically, it is the study of complementary networks that people and organizations use to collect, filters, process, create and distribute data.

–Aninformationsystem(IS)isagroupofcomponentsthatinteracttoproduceinformation.‖

A computer information system is a system composed of people and computers that processes or interprets information. The term is also sometimes used in more restricted senses to refer to only the software used to run a computerized database or to refer to only a computer system.

Information Systems is an academic study of systems with a specific reference to information and the complementary networks of hardware and software that people and organizations use to collect, filter, process, create and also distribute data. An emphasis is placed on an information system having a definitive boundary, users, processors, storage, inputs, outputs and the aforementioned communicationnetworks.

Any specific information system aims to support operations, management and decision-making. An information system is the information and communication technology (ICT) that an organization uses, and also the way in which people interact with this technology in support of businessprocesses.

Some authors make a clear distinction between information systems, computer systems, and business processes. Information systems typically include an ICT component but are not purely concerned with ICT, focusing instead on the end use of information technology. Information systems are also different from business processes. Information systems help to control the performance of business processes.

Alter argues for advantages of viewing an information system as a special type of work system. A work system is a system in which humans or machines perform processes and activities using resources to produce specific products or services for customers. An information system is a work system whose activities are devoted to capturing, transmitting, storing, retrieving, manipulating and displayinginformation.

As such, information systems inter-relate with data systems on the one hand and activity systems on the other. An information system is a form of communication system in which data represent and are processed as a form of social memory. An information system can also be considered a semi-formal language which supports human decision making and action.

Information systems are the primary focus of study for organizational informatics.

Types of information system

The "classic" view of Information systems found in the textbooks in the 1980s was a pyramid of systems that reflected the hierarchy of the organization, usually transaction processing systems at the bottom of the pyramid, followed by management information systems, decision support systems, and ending with executive information systems at the top. Although the pyramid model remains useful since it was first formulated a number of new technologies have been developed and new categories of information systems have emerged, some of which no longer fit easily into the original pyramidmodel.

Some examples of such systems are:

- **Data Warehouses:** In computing, a data warehouse (DW or DWH), also known as an enterprise data warehouse (EDW), is a system used for reporting and data analysis, and is considered a core component of business intelligence.

- **Enterprise Resource Planning:** Enterprise resource planning (**ERP**) is business process management software that allows an organization to use a system of integrated applications to manage the business and automate many back office functions related to technology, services and human resources.

- **Enterprise System:** Enterprise systems (ES) are large-scale application software packages that support business processes, information flows, reporting, and data analytics in complex organizations.

- **Expert Systems:** In artificial intelligence, an expert system is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, represented mainly as if–then rules rather than through conventional procedural code.

- **Search Engines:** A web search engine is a software system that is designed to search for information on the World Wide Web. The search results are generally presented in a line of results often referred to as search engine results pages (SERPs). The information may be a mix of web pages, images, and other types of files.

- **Geographic Information System:** A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. The acronym GIS is sometimes used for geographic information science (GIScience) to refer to the academic discipline that studies geographic information systems and is a large domain within the broader academic discipline of geo informatics.

- **Global Information System:** A global information system (GIS) is an information system which is developed and/or used in a global context. A global information system(GIS)is

any information system which attempts to deliver the totality of measurable data worldwide within a defined context.

- **Office Automation**: Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.

A **computer (based) information system** is essentially an IS using computer technology to carry out some or all of its planned tasks. The basic components of computer-based information systems are:

- *Hardware*- these are the devices like the monitor, processor, printer and keyboard, all of which work together to accept, process, show data and information.
- *Software*- is the programs that allow the hardware to process the data.
- *Databases*- are the gathering of associated files or tables containing related data.
- *Networks*- are a connecting system that allows diverse computers to distribute resources.
- *Procedures*- are the commands for combining the components above to process information and produce the preferred output.

Information Technology

What is Information Technology?

A 1958 article in Harvard Business Review referred to information technology as consisting of three basic parts: computational data processing, decision support, and business software.

This time period marked the beginning of IT as an officially defined area of business; in fact, this article probably coined the term.

Over the ensuring decades, many corporations created so-called "IT departments" to manage the computer technologies related to their business. Whatever these departments worked on became the *de facto* definition of Information Technology, one that has evolved over time. Today, IT departments have responsibility in areas like

- Computer Tech Support

- Business Computer Network and Database Administration

- Business Software Deployment

- Information Security

<p style="text-align:center">**WEEK-2**</p>

Role of Information Systems

Role of Information Technology in Manufacturing Sector

IT plays an important role in various sectors and industries. Similarly, IT strives to make things simpler in the manufacturing sector as well.

In an industry that automates things for the benefit of humankind, IT helps making the manufacturing process less cumbersome and more automated. IT helps drastically in delivering just-in-time insights, swift visibility, and seamless innovation for implementing new age solutions.

Role of Information Technology in Public Sector

At a time when public finances are under strain, governments must deliver new services and improve existing oes, while operating more efficiently and with greater transparency.

What we do

We help governments around the world address these challenges head-on. We draw upon deep client work and best practices from the global public and private sectors to help governments effectively utilize technology. Our strength lies in our unique ability to marry a client's strategic vision with theoperational and technological initiatives necessary to actualize that vision, including IT infrastructure consolidation, application rationalization, IT megaproject value assurance, and leanIT.

Examples of our work

In the past 5 years alone, we have supported more than 2,000 public-sector projects in 85 countries. Many of these projects had a significant focus on IT. Examples include the following:

- Working with a federal agency to give healthcare providers greater and easier access to healthcare data and, ultimately, improve the quality of patient care

- Helping a national government develop a broad policy on technology best practices and usage guidelines

- Supporting a regional government's efforts to improve operations and collaboration across agencies by consolidating support functions into centralized shared services and centers of excellence

- Working with a government agency to create a best-practice IT organization focused on improving existing services and launching new services

- Advising a government on cyber security risks and helping to develop a strategy for safeguarding IT operations

Through extensive work in both the public and private sectors, we—along with colleagues in our

Business Technology Practice—have developed and tested a robust set of proprietary research, data, tools, and solutions that allow us to better serve our clients.

Information Technology & Its Role in the Modern Organization

Information technology (IT) has become a vital and integral part of every business plan. From multi-national corporations who maintain mainframe systems and databases to small businesses that own a single computer, IT plays a role. The reasons for the omnipresent use of computer technology in business can best be determined by looking at how it is being used across the business world.

Communication:

For many companies, email is the principal means of communication between employees, suppliers and customers. Email was one of the early drivers of the Internet, providing a simple and inexpensive means to communicate. Over the years, a number of other communications tools have also evolved, allowing staff to communicate using live chat systems, online meeting tools and video-conferencing systems. Voice over internet protocol (VOIP) telephones and smart-phones offer even more high-tech ways for employees to communicate.

Inventory Management:

When it comes to managing inventory, organizations need to maintain enough stock to meet demand without investing in more than they require. Inventory management systems track the quantity of each item a company maintains, triggering an order of additional stock when the quantities fall below a pre-determined amount. These systems are best used when the inventory management system is connected to the point-of-sale (POS) system. The POS system ensures that each time an item is sold, one of that item is removed from the inventory count, creating a closed information loop between all departments.

Data Management:

The days of large file rooms, rows of filing cabinets and the mailing of documents is fading fast. Today, most companies store digital versions of documents on servers and storage devices. These documents become instantly available to everyone in the company, regardless of their geographical location. Companies are able to store and maintain a tremendous amount of historical data economically, and employees benefit from immediate access to the documents they need.

Management Information Systems

Storing data is only a benefit if that data can be used effectively. Progressive companies use that data as part of their strategic planning process as well as the tactical execution of that strategy. Management Information Systems (MIS) enable companies to track sales data, expenses and productivity levels. The information can be used to track profitability over time, maximize return on investment and identify areas of improvement. Managers can track sales on a daily basis,

allowing them to immediately react to lower-than-expected numbers by boosting employee productivity or reducing the cost of an item.

Customer Relationship Management

Companies are using IT to improve the way they design and manage customer relationships. Customer Relationship Management (CRM) systems capture every interaction a company has with a customer, so that a more enriching experience is possible.

Role of Information Technology in Management

The role of Information Technology to the world had become unimaginable - it plays very important roles, not just in business management - but in other aspects of businesses as well.
Traditional businesses do things in very –analog basis. Meaning, they have non-computerized methods of doing things - from transaction, attendance, employee management and list, stock keeping and other aspects of the business. They do a lot of things by means of pen and papers, and are pretty much trained and are very used to do so.

The Importance of Information Technology in Education

The world of education is changing as the modern world continues to grow. With so much progress happening, it's important that education be able to reach students in new ways so that their students are prepared for the future. The students of today are the leaders, inventors, teachers, and businessmen (and women) of tomorrow. Without the proper skills, these students will not have the preparation needed to survive.

The Importance of Information Technology in Finance

Information technology has also made it faster and easier than ever to send or receive money. It's now also easier to open an online small business to sell whatever you might want. If you don't want to have to file for a domain name, set up a website, and all the other steps required for
registering an online business, you can use other websites like Amazon, eBay, and Etsy to sell things.

The Importance of Information Technology in Healthcare

Improvements in information technology have allowed for great reform in healthcare. Most medical offices can now send and receive digital medical information from doctors you've had in the past. Changes like this allow costs to be lowered and increase the amount of time doctors can spend on patients compared to paper work.

Along with the changing the amount of paperwork required at your medical office, information technology has also updated the technology a doctor can use to diagnose or treat you

The Importance of Information Technology in Security

With so many transactions done online and so much information available online, it's important to keep all of that safe. Information technology makes it possible for your online data to stay secure until

accessed by the proper channels.

Information Technology and Business

Functions of manager:

Managers have 5 basic functions. They are
1. Planning
2. Organizing
3. Staffing
4. Directing
5. Controlling

Other functions are
1. Coordinating
2. Reporting
3. Budgeting

Managers have to plan or narrow goals from their broadcast to most intricate form. They must organize and create a structure for daily tasks and communication. They must hire and fire people from various positions. They must serve as directing influence on staff behavior and morale. They must also have control over all the aspects of the company.

- **Planning** − The basic step required for any project, big or small, is the planning stage. The manager needs to plan the schedule and give the blueprint of how the task is to be done with all the necessary details, and also the manager should have a backup plan that if this doesn't work then what next. **Example** − There is a new project, how to start, human resource required, resources required, etc., everything should be planned.

- **Organizing** − Next comes the organizing part, where the manager needs to synchronize and have to make sure everything is going according to the plan. Everything should work as per the plan, and if not then the manager needs to look into the issue and make it work as planned. **Example** − A software tester is required, so organize the venue, date and time to interview those eligible for the post.

- **Staffing** − In simple words, staffing means grouping of people into different teams and allotting different tasks to them. If the team members have some disputes then the team member needs to report to the team leader who will forward it to the manager and the issue will be taken care of. **Example** − Assembling a new team for a new project.

- **Directing/Leading** − It is a manager's responsibility to guide the employees in all situations in order to avoid conflicts and delay in the task. Manager has to lead the employees so that they can get a clear idea about what is to be done and how to do it. **Example** − a team needs a team leader to look after each task that is accomplished, in- process, or aborted.

- **Controlling** − Last but of course not the least role played by the manager is having everything under control. Whether it is the budget, or resource allocation, everything should be in order.

Example − All members of a team cannot be granted leave on the same day, as it affects work delivery.

- **Coordinating** − It means bringing all the employees together by forming an efficient relationship and making them feel comfortable to share their views and issues freely. **Example** − Coordinating the schedule for a project.

- **Reporting** − The manager has to keep updated information about all the ongoing tasks, and it is the sole responsibility of the manager to report the updated status to the higher authorities; while all the employees are bound to report to the manager. **Example** − Keeping the respective directors informed about the progress on their respective projects.

- **Budgeting** − A task has to be completed within the given time frame as well as it should be cost efficient. The manager needs to be double sure that all the amount invested in the project doesn't exceed the budget given and in case of imbalance, the budgeting manager has to report to the management. **Example** − If budget allows to place three employees then five employees cannot be assigned for the task.

Levels of Management and Their Functions:

Level of management is to divide authority and **responsibility of the organization** among the various managerial positions. Basically management is divided into three levels in which different managerial functions are to be performed by different managerial positions holders who are named differently in different levels. Their authorities and responsibilities are different, however, they all perform well, effectively, efficiently and coordinately the corporate goals surely achieved.

These three levels of management can be studied as follows:

1. *Top level management:*
   Top level management is concerned with the broad policy framework and is related to develop attitude. It consists of board of directors, chairman, managing directors, strategists and alike.

They are responsible for the welfare, and survival of **the organization**. In this level, the corporate goals, missions and objectives are determined and a detailed action plan and strategies for the same are formulated.

Functions of top level management
    i. To formulate and determine the objectives and define the goals of the business.
    ii. To establish policies and prepare plans to attain goals.
    iii. To set up an organizational structure to conduct the operations as per the plans.
    iv. To provide overall direction in the organization.
    v. To assemble the resources necessary for the attainment of the policy and execution of the plan.
    vi. To control effectively the business operations.
    vii. To judge and evaluate the results.

Distinction between Management and Administration:
Following are the main differences between management and administration:

    i. **Nature of functions:** Management is executive function. Administration is thinking or determinable function.

    ii. **Types of work:** Management activates the policies and plans into action laid down by administration. It is concerned with implementation. Administration relates with formulation of objective, mission and purpose and policies of an organization.

    iii. **Level of authority:** Management is an operative level of the organization. Administration is top level activity.

    iv. **Decision making:** Management may take decision; however, it is influenced by values, opinions and beliefs of administration. Administration takes decision considering the public opinion, government policies, ritual norms and social values.

    v. **Use:** The term 'management' is used in private business sector. The term 'administration' is used in public or government sectors of undertakings.

    vi. **Functions:** The main functions of management are directing, motivating and controlling. The main functions of administration are planning and organizing.

    vii. **Ability:** Management requires technical and professional ability. Administration requires only administrative quality rather than technical quality.

    viii. **Status of performer:** Managerial personnel consists of paid employees with specialized knowledge to perform the given tasks. Administrative groups consist of owners who invest capital and participate in profit in the form of dividend.

2. *Middle level management*
The middle level consists of departments, divisions and sections, in which the respective chiefs, heads or managers are concerned with the tasks of implementing the policies and plans prepared by the top level management. They are the real subordinates to top managers. Being in the middle, the managers have to perform as a link between top level and lower level

management.

Functions of middle level management

i. To implement the task set by top management.
ii. To interpret the policies framed by the top management.
iii. To run the organization effectively and efficiently.
iv. To cooperate for the smooth functioning of the organization.
v. To coordinate between different departments.
vi. To recruit, select and train the employees for better functioning of the departments.
vii. To issue the instructions to the lower level management.
viii. To motivate the workers and staffs for higher productivity.
ix. To lead the department and build-up and organizational spirit.
x. To report and make suitable recommendations to the top level management for the better execution of the plans and policies.

Characteristics of Management:

The main features of management are as follows:

I. **Management is a Distinct Process:** Management is a distinct process which is followed and performed by the organization to determine the accomplishment of the organizational objective and continue till the objectives are achieved.

II. **Management is Art And Science:** Management is an art because the result of management depends upon the capacity and skill of personnel, managers and administrators. Management is science because it has developed certain principles which are universally accepted and can be applied.

III. **Management is a Profession:** Due to the established principles of management, it has become profession. Management has a systematic and specialized body of knowledge, principles and techniques which can be taught as well as applied in practice.

IV. **Management is Goal Oriented:** Principles of management are goal oriented. The goals may be to maximize profit, to maximize efficiency, to determine economy, to render social satisfaction and welfare to the people.

V. **Management is a Group Activity:** Management is a group activity because it is a collective approach to management. It refers to group efforts.

VI. **Management is an Integrating Process:** The important element of management is the integration of human and other resources for effective performance. Management integrates men, money and materials for carrying out the operations for achieving the stated goals.

VII.   **Social Process:** Management is social process. It comes under humanistic concept and deals with people.

VIII.   **Management is a Dynamic Function:** Management is a dynamic function because it has to be performed regularly and continuously. Management also operates in an ever-changing environment.

IX.   **Intangible:** Management is virtually intangible. It is an unseen force and process, however its results are apparent. It can be felt on the basis of work environment and working conditions; and its effectiveness and productiveness can be judged on the basis of the results.

X.   **Multidisciplinary activity:** Management is a mixture of knowledge of different disciplines. It draws knowledge and concepts from economics, psychology, sociology, mathematics, statistics, operation research, production technology etc. It integrates the ideas and concepts of other discipline and uses those all in managing the organization.

3. *Lower level management*

Lower level management is also known as supervisory level of management in which the supervisors and foremen and others like sales officers, accounts officers etc. take responsibilities of the implementation and control of the operational plans developed by the middle level managers. It is clear that the actual operations are performed in this level of management. This level is concerned with actual implementation and control of operational plans.

Functions of lower level management

i.   To issue the orders and instruction to the workers.
ii.   To supervise and control the performance.
iii.   To plan the activities of the sections.
iv.   To direct and guide the workers about the work procedures.
v.   To provide on the job training to the workers.
vi.   To arrange necessary tools, equipment, materials for the workers and look after their proper maintenance.
vii.   To solve the problems of workers.
viii. To develop sense of co-operation and high group spirit among the workers.
ix.   To advise the middle level about the work environment.

x. To inform the unsolved problems of the workers to the middle level management.

Meaning and Concepts of Management:

Meaning of Management
It is realized that no definition of management has been universally accepted. It is very difficult to define management. Many experts and professionals have defined management in different ways.

Generally, management means getting things done through others. Management is a process which includes planning, organizing, executing and controlling of different activities in order to achieve the objectives by using human and other resources.

Concepts of Management
The concept of management in different perspectives is as follows:

I. **Functional concept of Management:** Functional concept of management states that, management is meant what manager does to accomplish the objective.

II. **Human Relation Concept of Management:** Human relation concept of management states that management is meant to get things done through others to perform the organizational tasks or activities through people. This concept is concerned with an art of getting things done through others.

III. **Leadership And decision making concept Of Management:** According to this concept, management is meant as an art and science of decision making and leadership.

IV. **Productive Concept of Management:** According to the productive concept, management is considered as an art of increasing productivity. This concept emphasizes upon increasing in productivity.

V. **Integration Concept of Management:** This concept is focused as management which coordinates the human and material resources. Integration concept of

management assumes that organizational objectives could be achieved if human and other resources are well and effectively coordinated and integrated.

Management Roles:

A manager's role is very crucial in an organization. The success of organization depends upon manager's ability in utilizing the resources for achieving the pre determined goals. Henry Mintzberg suggested three areas where a manger has to work.
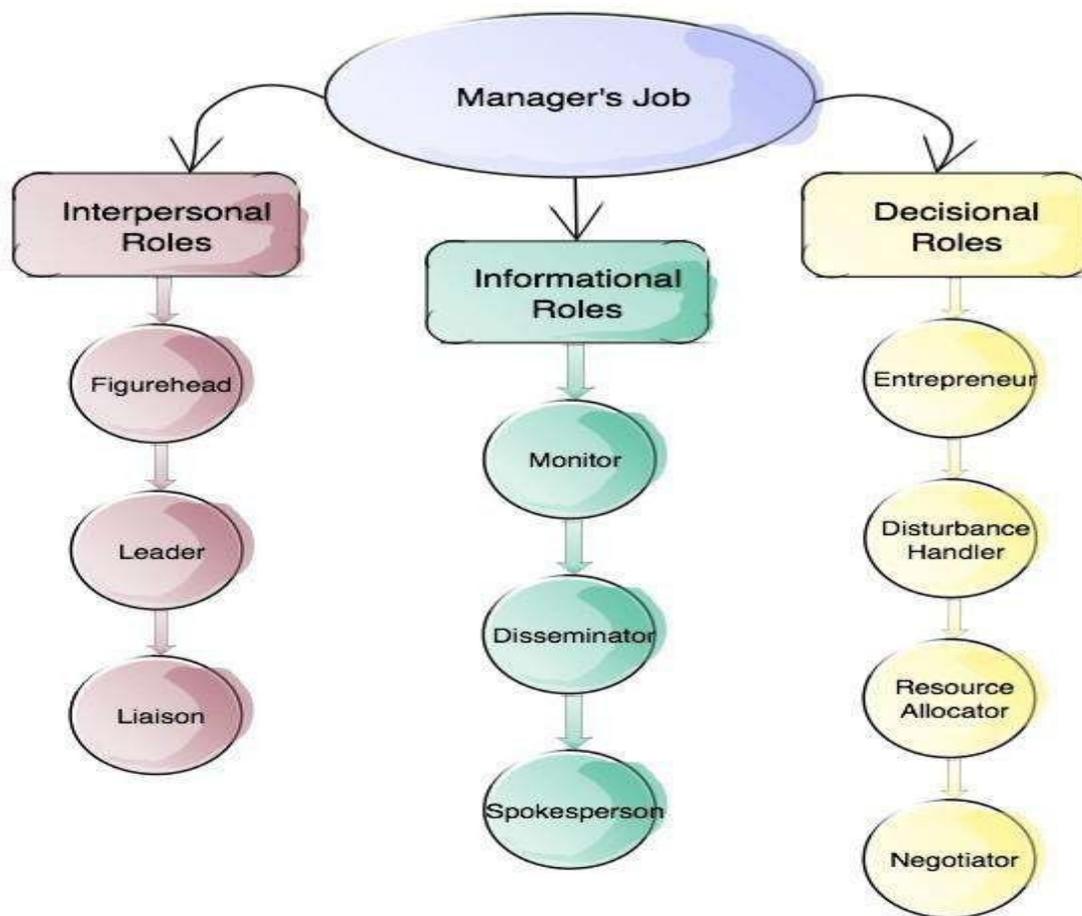
Interpersonal Roles

1. **The Figurehead:** performs ceremonial duties. *Examples: greeting visiting dignitaries, attending an employee's wedding, taking an important customer to lunch.*
2. **TheLeader:**responsibilityfortheworkofsubordinates,motivatingandencouraging employees, exercising their formal authority.
3. **The Liaison:** making contacts outside the vertical chain of command including peers in other companies or departments, and government and trade organization representatives.

Informational Roles:

4. **The Monitor:** scans the environment for new information to collect.
5. **The Disseminator:** Passing on privileged information directly to subordinates.
6. **The Spokesperson:** Sharing information with people outside their organization. *Examples: a speech to a lobby or suggesting product modifications to suppliers.*

Decisional Roles

7. **The Entrepreneur:** Seeks to improve the unit by initiating projects.

8. **The Disturbance Handler:** Responds involuntarily to pressures too severe to be ignored. *Examples: a looming strike, a major customer gone bankrupt, or a supplier reneging on a contract.*
9. **The Resource Allocator:** Decides who gets what.
10. **The Negotiator:** Committing organizational resource sin–real-time with the broad information available from their informational roles.

Applying the Model for Improvement

As a manager, you may tend to shy away from some of these roles that you don't favor i.e. you may tend to avoid monitoring and handling disturbances. Recognizing your strengths and weaknesses according to these ten roles can help you to develop your skills and knowledge and become a more well rounded manager.

ACTIVITY: Think about how much time you spend on each role. Write down the ten roles on a piece of paper and score yourself from 1–5 on each role with 1 being –Very skilled‖ to 5 being –Not skilled at all.‖ Consult the list below for improvement tips in the roles where you scored the lowest.

Tips for Improvement

1. **Figurehead:** If you struggle wearing this hat, start with cultivating humility and empathy. Focus on using your energy to be a good role model and become more aware of your image and reputation and how you can consistently display model behavior.

2. **Leader:** Anyone can be a leader, but not everyone can be an authentic leader who is respected by his or her team. The most important skill here to develop to improve is emotional intelligence.

3. **Liaison:** Not everyone is comfortable being a networking ham, but it's part of the job. You can start by attending small networking events and work your way out.

4. **Monitor:** The challenge of this aspect lies in its details. Become a better–skim me so you can scan through a lot of information and get to the big picture without experiencing information overload. It's also important in this area to keep up with industry news.

5. **Disseminator:** If you struggle in this area, work on improving your communication skills. Knowing not only what to share, but how and with whom. If you have difficulty expressing things properly, engage a colleague to help in the beginning with proofreading or being a second pair of eyes as you adjust in this role.

6. **Spokesperson:** This is an area where a lot of people feel challenged. Read blogs and research how to deliver great presentations and how to deal with the media. Speak with your company leaders to discuss how the company's brand or image should be represented in the community.

7. **Entrepreneur:** Work on problem solving and creativity skills or again, if this is not your

strength, employcolleagueswhoexcelherewithbrainstormingsessionsor–crazyideas‖ meetings. In addition, change management is a huge necessity in this area.

8. **Disturbance Handler:** You can read up on how to handle team conflict to improve your conflict resolution skills, but it may also be helpful to constructively coach team members who have a habit of bringing emotion into the office.

9. **Resource Allocator:** To wear this hat, prioritization is key. Take advantage of online tools and systems for this as well as budgeting tips.

10. **Negotiator:** Read about Distributive Bargaining or Win-Win Negotiations to beef up your skills. Role playing can also be an important tool here to strengthen your ability to negotiate.

Introduction to MS Excel

MS EXCEL

Microsoft Excel is a commercial spreadsheet application, written and distributed by Microsoft for Microsoft Windows and Mac OS X. At the time of developing these training modules, we have used Microsoft Excel version 2016. Microsoft Excel is a spreadsheet tool capable of performing calculations, analyzing data, and integrating information from different programs.

GETTING STARTED WITH MS EXCEL:

how to start an excel 2010 application in simple steps. Assuming you have Microsoft Office 2010 installed in your PC, start the excel application following the below mentioned steps in your PC.

Step 1 − Click on the **Start** button.

Start Button
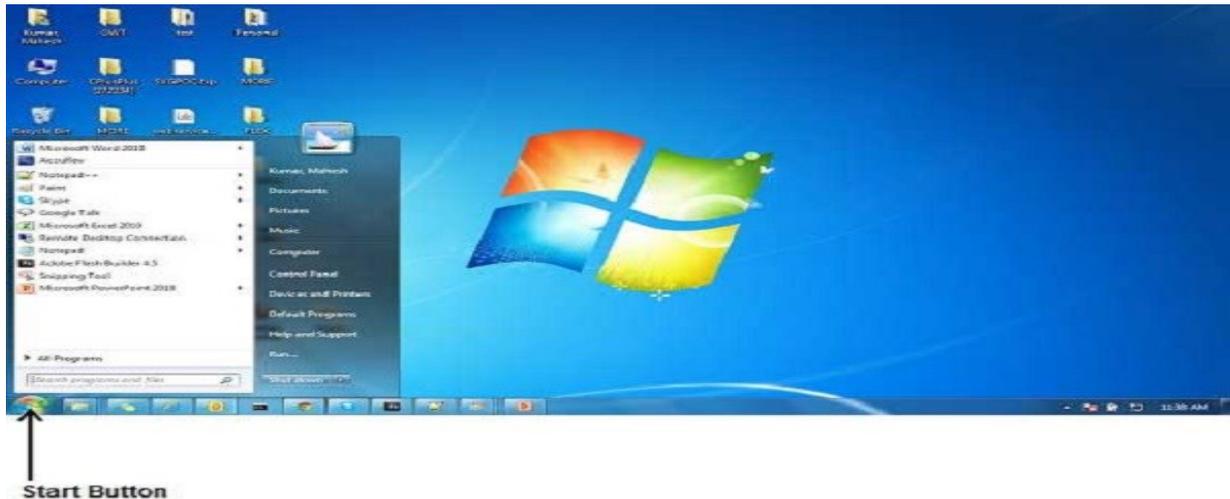
Step 2 − Click on **All Programs** option from the menu.

All Programs

Step 3 − Search for **Microsoft Office** from the sub menu and click it.

Microsoft Office

Step 4 − Search for **Microsoft Excel 2010** from the submenu and click it.

Microsoft Excel 2010

This will launch the Microsoft Excel 2010 application and you will see the following excel window.
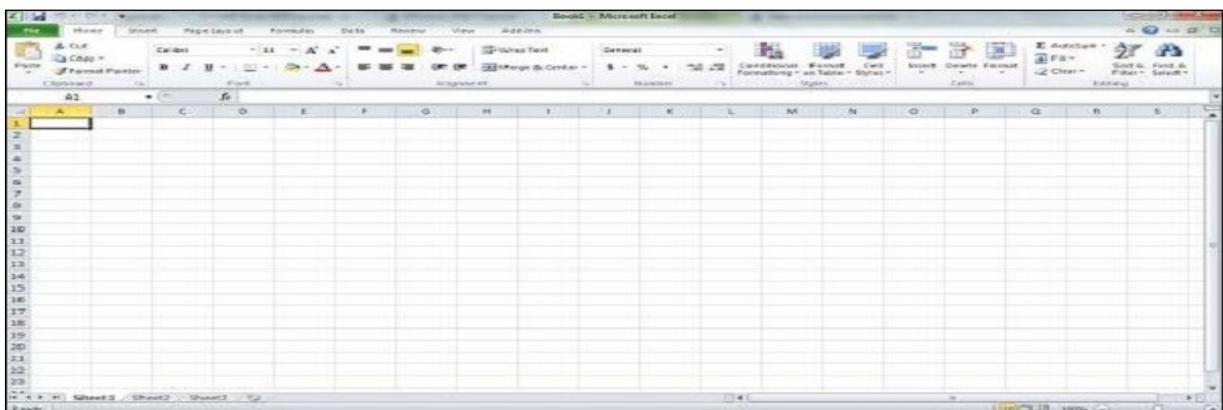
Explore Window in Excel 2010

The following basic window appears when you start the excel application. Let us now understand the various important parts of this window.
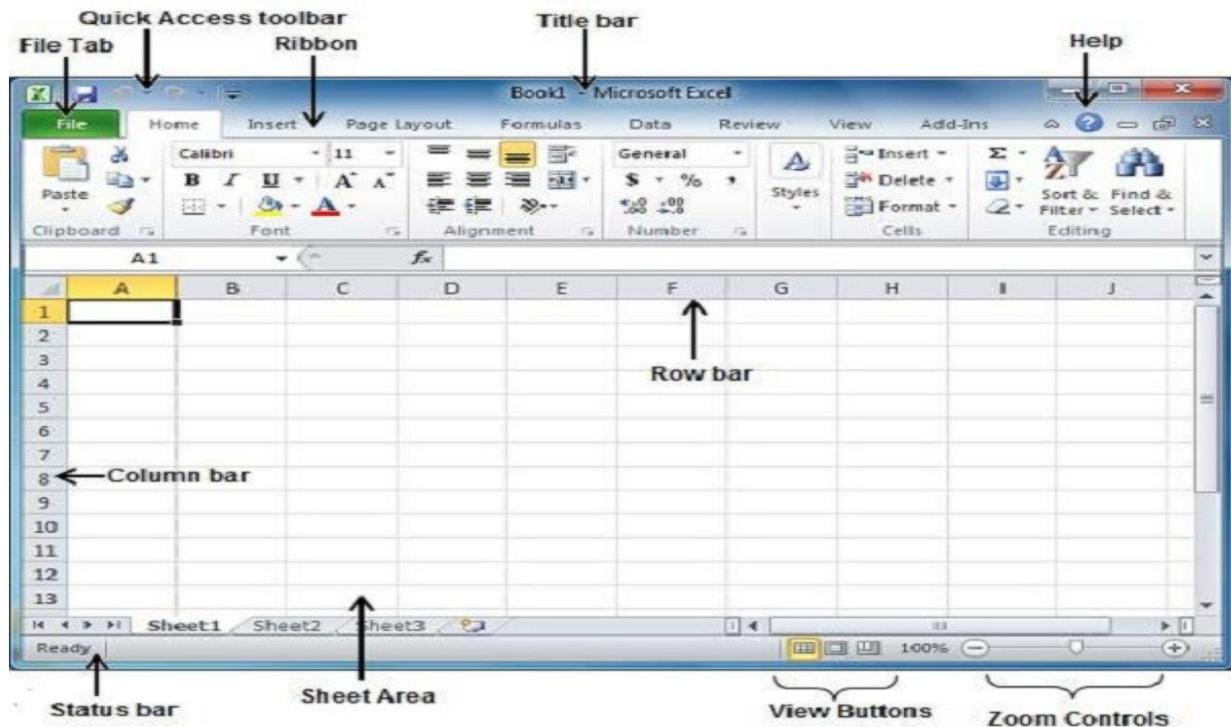
File Tab

The File tab replaces the Office button from Excel 2007. You can click it to check the **Back stage view,** where you come when you need to open or save files, create new sheets, print a sheet, and do other file-related operations.

Quick Access Toolbar

You will find this toolbar just above the **File tab** and its purpose is to provide a convenient resting place for the Excel's most frequently used commands. You can customize this toolbar based on your comfort.

Ribbon
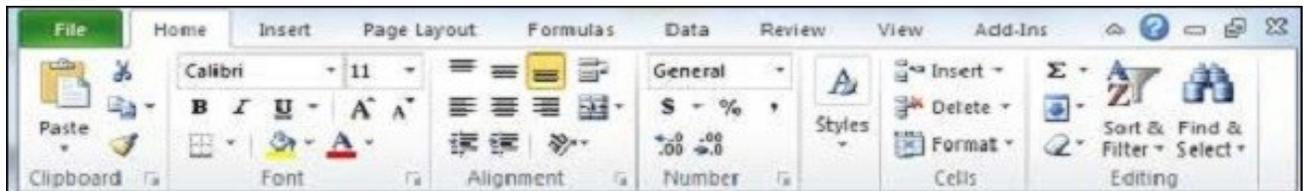
Ribbon contains commands organized in three components −

- **Tabs** − They appear across the top of the Ribbon and contain groups of related commands. Home, Insert, Page Layout are the examples of ribbon tabs.

- **Groups** − They organize related commands; each group name appears below the group on the Ribbon. For example, group of commands related to fonts or group of commands related to alignment etc.

- **Commands** − Commands appear within each group as mentioned above.

Title Bar

This lies in the middle and at the top of the window. Title bar shows the program and the sheet titles.

Help

The **Help Icon** can be used to get excel related help anytime you like. This provides nice tutorial on various subjects related to excel.

Zoom Control

Zoom control lets you zoom in for a closer look at your text. The zoom control consists of a slider that you can slide left or right to zoom in or out. The + buttons can be clicked to increase or decrease the zoom factor.

View Buttons

The group of three buttons located to the left of the Zoom control, near the bottom of the screen, lets you switch among excel's various sheet views.

- **Normal Layout view** − This displays the page in normal view.

- **Page Layout view** − This displays pages exactly as they will appear when printed. This gives a full screen look of the document.

- **Page Break view** − This shows a preview of where pages will break when printed.

Sheet Area

The area where you enter data. The flashing vertical bar is called the **insertion point** and it represents the location where text will appear when you type.

Row Bar

Rows are numbered from 1 onwards and keep on increasing as you keep entering data. Maximum limit is 1,048,576 rows.

Column Bar

Columns are numbered from A onwards and keeps on increasing as you keep entering data. After Z, it will start the series of AA, AB and so on. Maximum limit is 16,384 columns.

Status Bar

This displays the current status of the active cell in the worksheet. A cell can be in either of the fours states (a) **Ready** mode which indicates that the worksheet is ready to accept user inpu (b) **Edit** mode indicates that cell is editing mode, if it is not activated the you can activate editing mode by double-clicking on a cell (c) A cell enters into **Enter** mode when a user types data into a cell (d) **Point** mode triggers when a formula is being entered using a cell reference by mouse pointing or the arrow keys on the keyboard.

Dialog Box Launcher

This appears as a very small arrow in the lower-right corner of many groups on the Ribbon. Clicking this button opens a dialog box or task pane that provides more options about the group.

SHEET INFORMATION

When you click **Info** option available in the first column, it displays the following information in the second column of the backstage view −

- **Compatibility Mode** − If the sheet is not a native excel 2007/2010 sheet, a Convert button appears here, enabling you to easily update its format. Otherwise, this category does not appear.

- **Permissions** − You can use this option to protect the excel sheet. You can set a password so that nobody can open your sheet, or you can lock the sheet so that nobody can edit your sheet.

- **Prepare for Sharing** − This section highlights important information you should know about your sheet before you send it to others, such as a record of the edits you made as you developed the sheet.

- **Versions** − If the sheet has been saved several times, you may be able to access previous versions of it from this section.

SHEET PROPERTIES

When you click **Info** option available in the first column, it displays various properties in the third column of the backstage view. These properties include sheet size, title, tags, categories etc.

You can also edit various properties. Just try to click on the property value and if property is editable, then it will display a text box where you can add your text like title, tags, comments, Author.

Exit Backstage View

It is simple to exit from the Backstage View. Either click on the **File tab** or press the Esc button on the keyboard to go back to excel working mode.

FEATURES AND USES OF MICROSOFT EXCEL:

1 – You Can Insert a New Worksheets

2 – Time Saving Shortcut Keys

3 – Get Quick Sum of Numbers

4 – Filtering Data

5 – Paste special Feature

6 – Insert Random Numbers

7 – Insert Random Fraction Numbers

8 – Goal Seek Analysis Tool

9 – Insert Serial Number

Context Help in Excel 2010

MS Excel provides context sensitive help on mouse over. To see context sensitive help for a particular Menu option, hover the mouse over the option for some time. Then you can see the context sensitive Help as shown below.
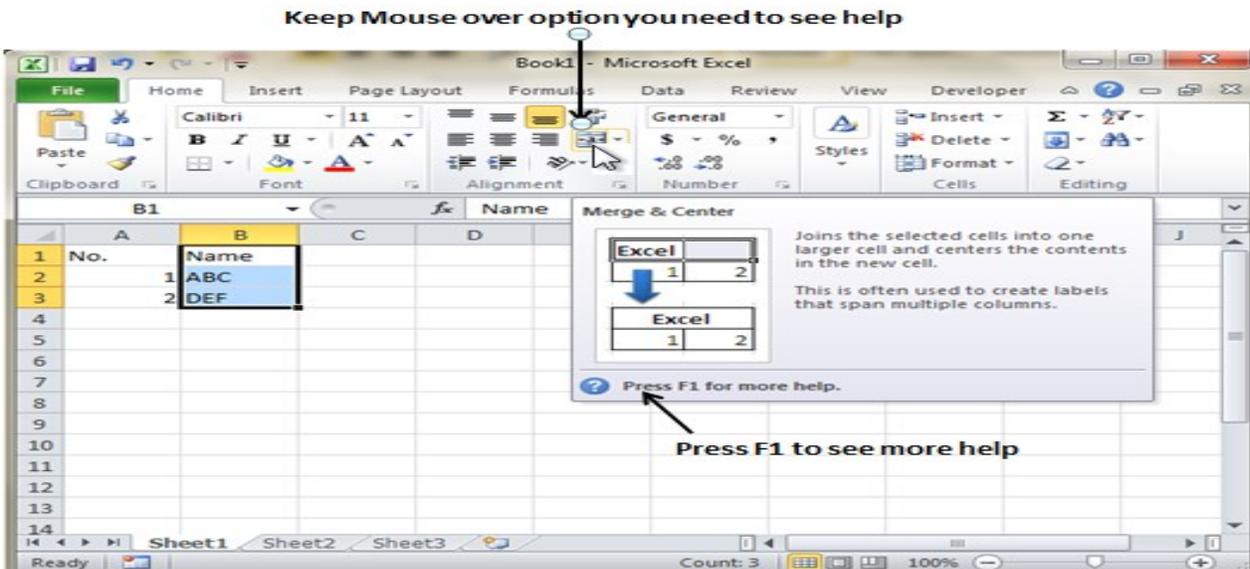
Getting More Help

For getting more help with MS Excel from Microsoft you can press **F1** or by **File → Help → Support → Microsoft Office Help**.
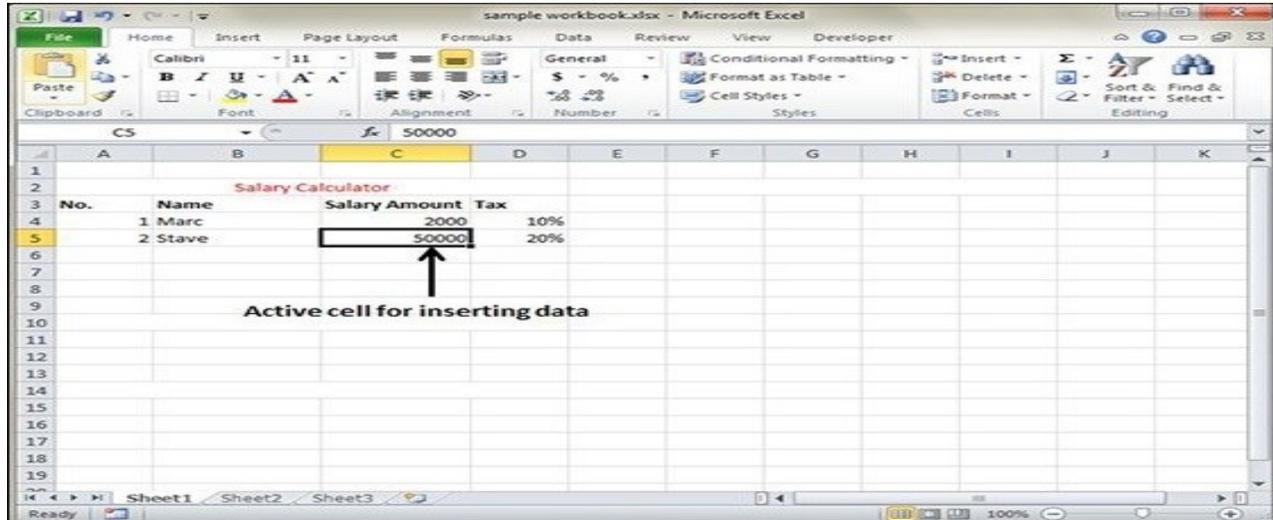

Insert Data in Excel 2010

In **MS Excel,** there are **1048576*16384** cells. MS Excel cell can have **Text, Numeric value or formulas.** An MS Excel cell can have maximum of 32000 characters.

Inserting Data

For **inserting data** in **MS Excel,** just activate the cell type text or number and press enter or Navigation keys.

Inserting Formula

For inserting formula in MS Excel go to the formula bar, enter the formula and then press enter or navigation key. See the screen-shot below to understand it.
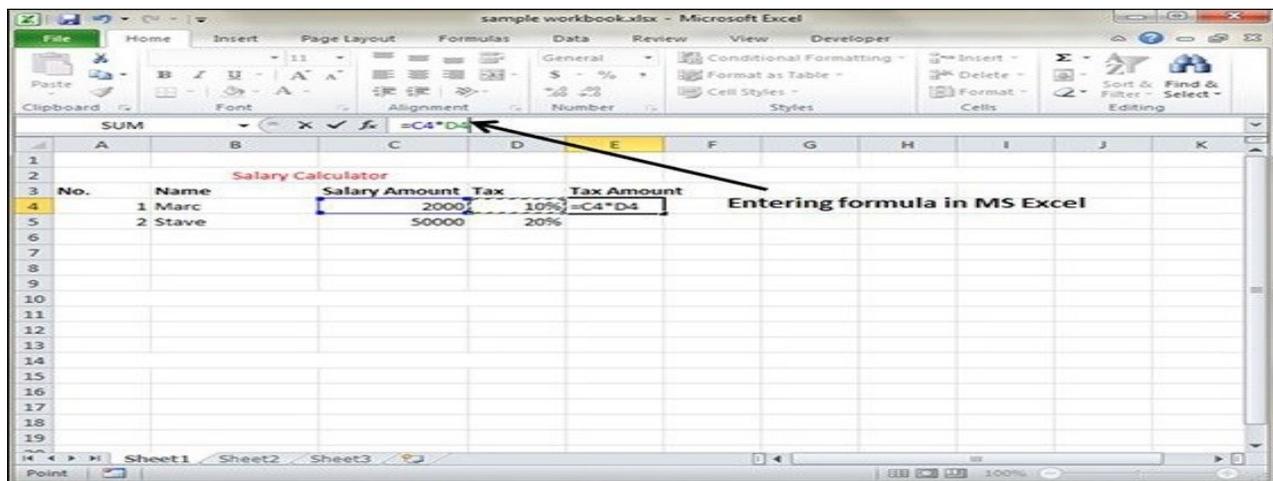
Modifying Cell Content

For modifying the cell content just activate the cell, enter a new value and then press enter or navigation key to see the changes. See the screen-shot below to understand it.
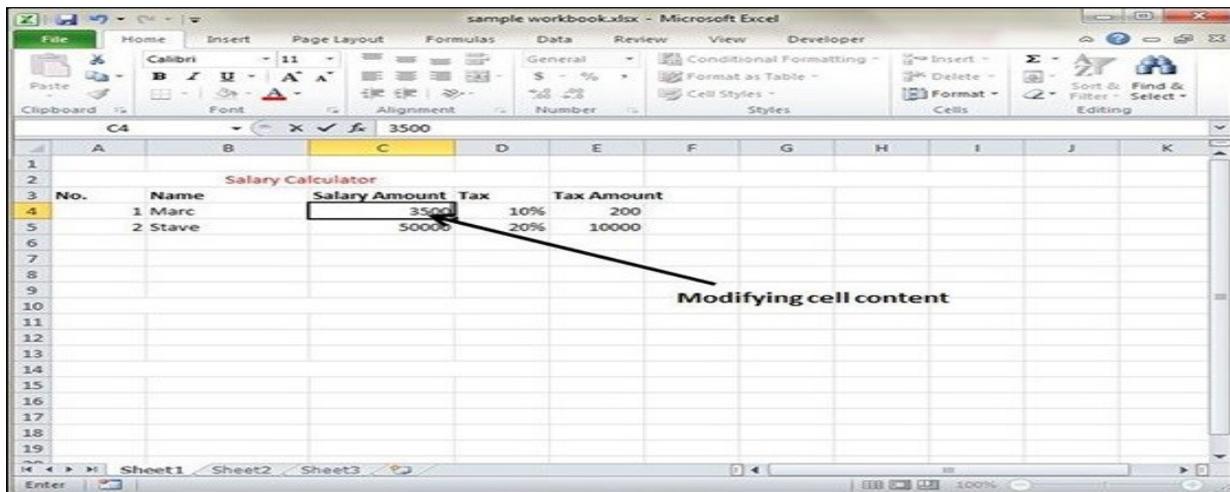
Select Data in Excel 2010

MS Excel provides various ways of selecting data in the sheet. Let us see those ways.

Select with Mouse

Drag the mouse over the data you want to select. It will select those cells as shown below.
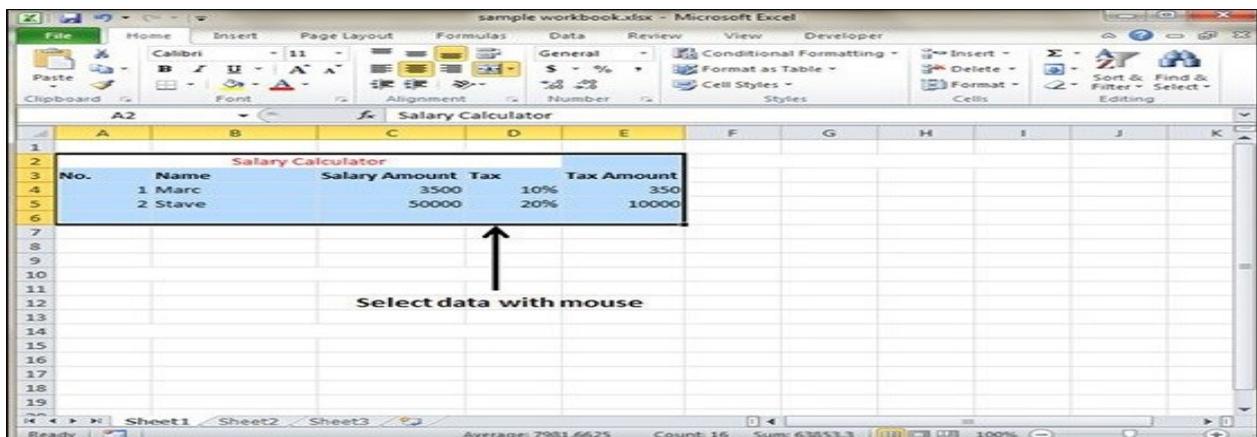
Select with Special

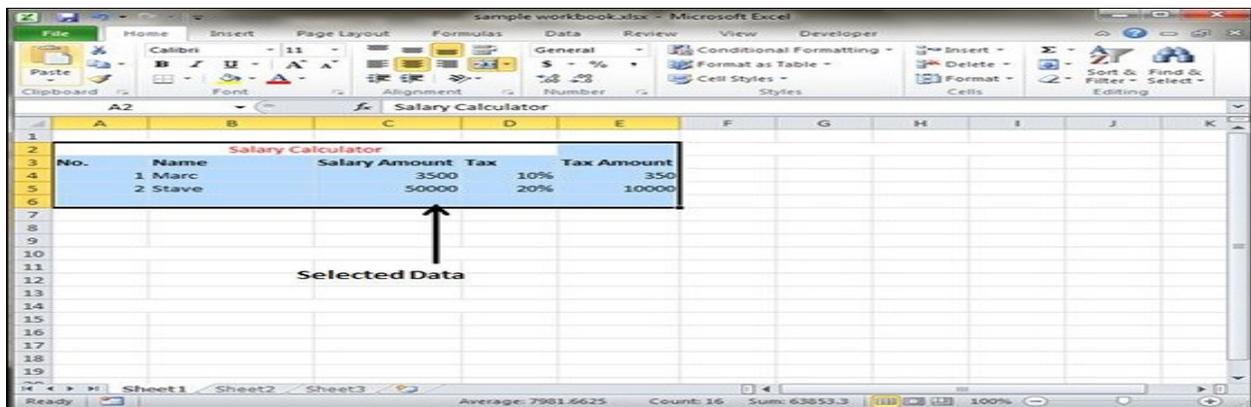If you want to select specific region, select any cell in that region.

Pressing **F5** will show the below dialogue box.
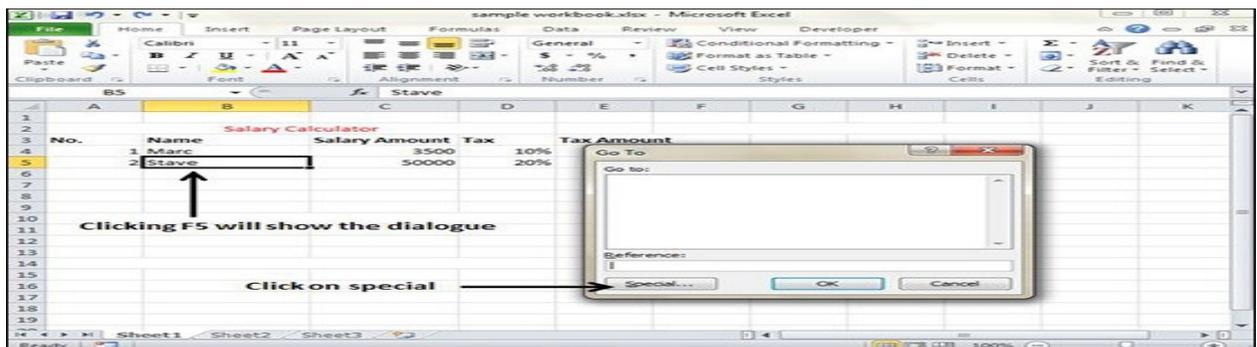
Click on **Special button** to see the below dialogue box. Select **current region** from the radio buttons. Click on **ok** to see the current region selected.
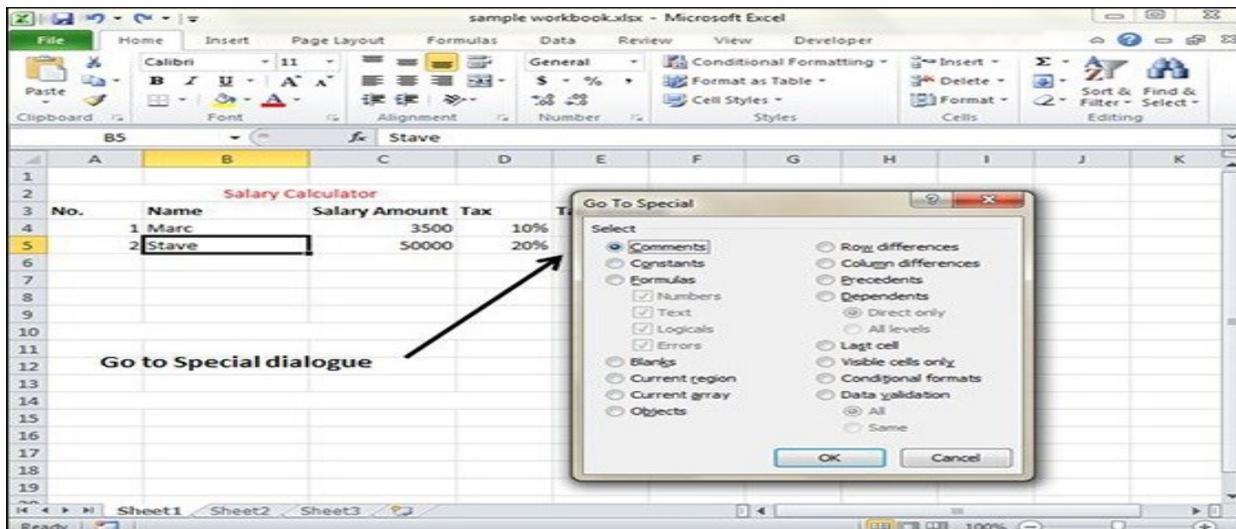
As you can see in the below screen, the data is selected for the current region.

Delete Data in Excel 2010

MS Excel provides various ways of deleting data in the sheet. Let us see those ways.

Delete with Mouse

Select the data you want to delete. **Right Click** on the sheet. Select the **delete option**, to delete the data.
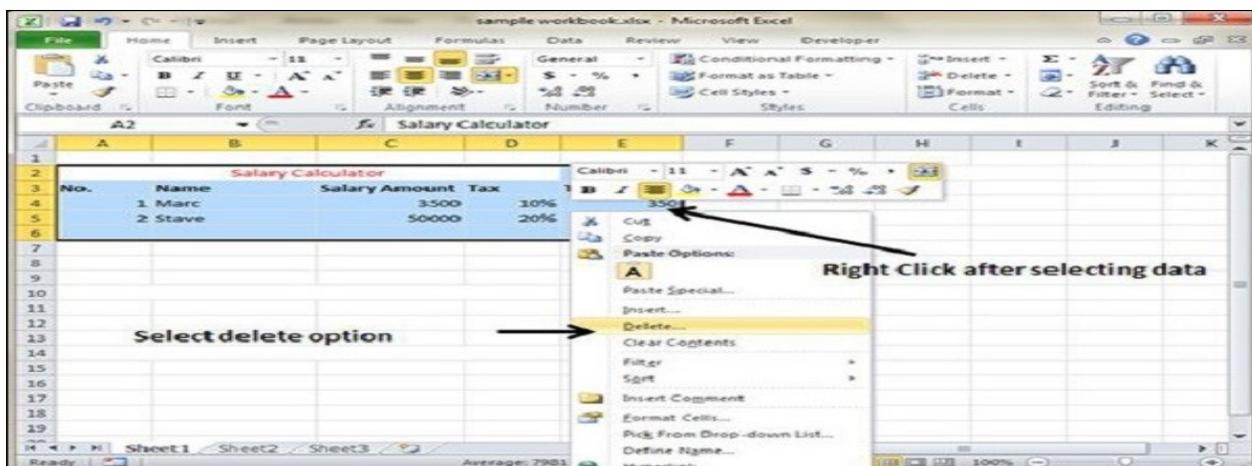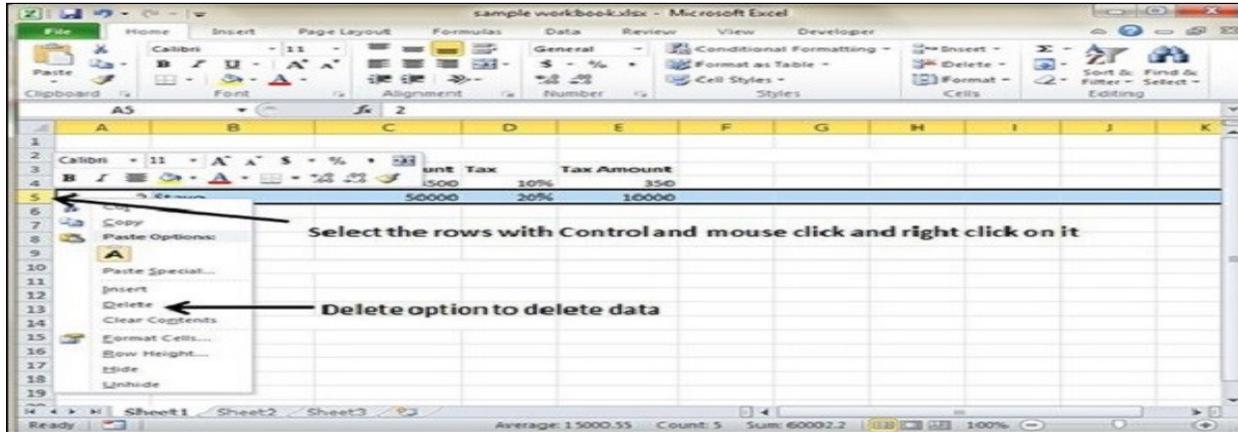

Delete with Delete Key

Select the data you want to delete. Press on the **Delete Button** from the keyboard, it will delete the data.
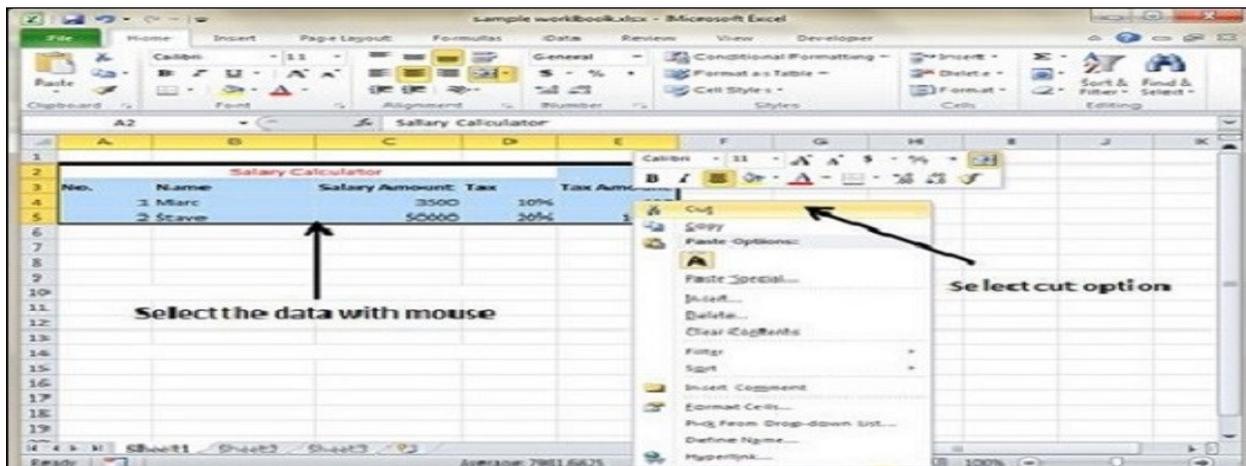
Selective Delete for Rows

Select the rows, which you want to delete with **Mouse click + Control Key.** Then right click to show the various options. Select the **Delete option** to delete the selected rows.
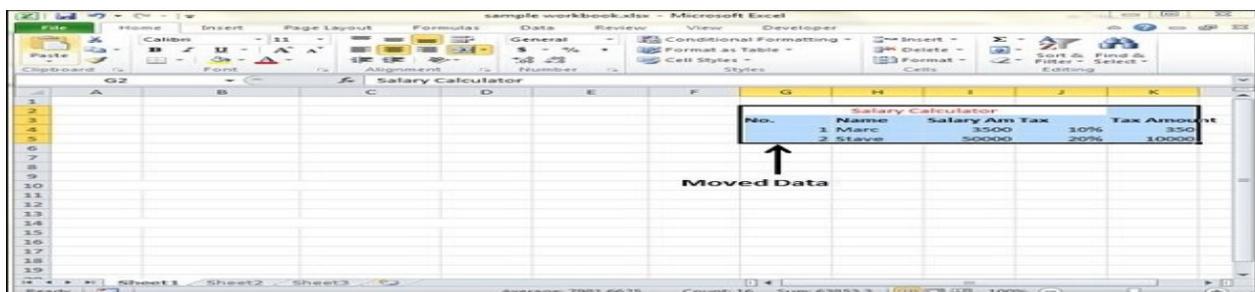

Move Data in Excel 2010

Let us see how we can **Move Data** with **MS Excel**.

Step 1 − Select the data you want to Move. **Right Click** and Select the **cut option.**

Step 2 − **Select the first cell** where you want to move the data. Right click on it and **paste the data**. You can see the data is moved now.

Rows & Columns in Excel 2010

Row and Column Basics

MS Excel is in tabular format consisting of rows and columns.

- Row runs horizontally while Column runs vertically.

- Each row is identified by row number, which runs vertically at the left side of the sheet.

- Each column is identified by column header, which runs horizontally at the top of the sheet.

For **MS Excel** 2010, Row numbers ranges from **1 to 1048576;** in total **1048576** rows, and Columns ranges from **A to XFD;** in total **16384** columns.

Navigation with Rows and Columns

Let us see how to move to the last row or the last column.

- You can go to the last row by clicking **Control + Down Navigation arrow.**

- You can go to the last column by clicking **Control + Right Navigation arrow.**
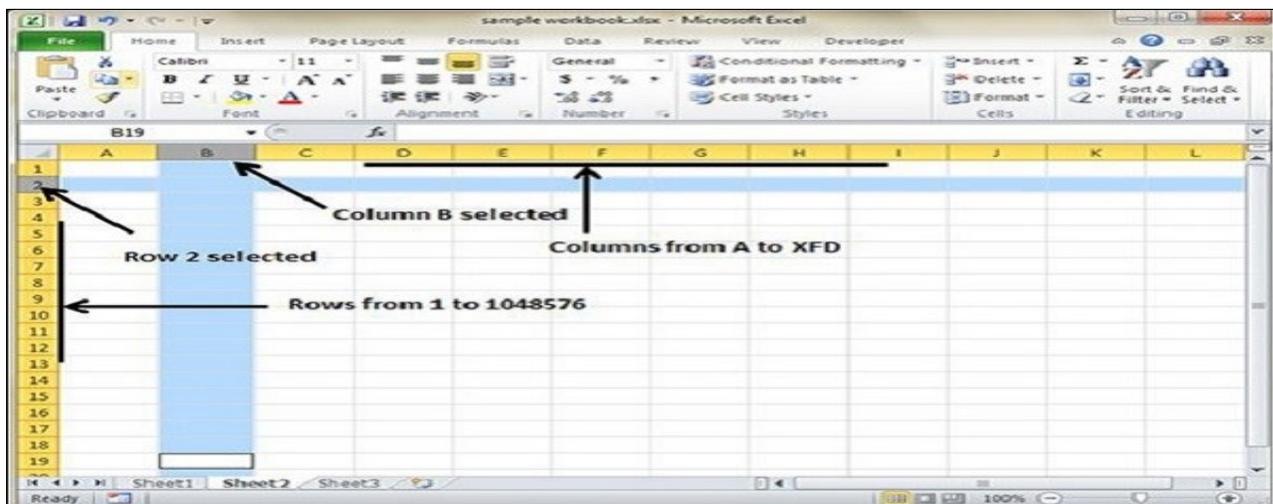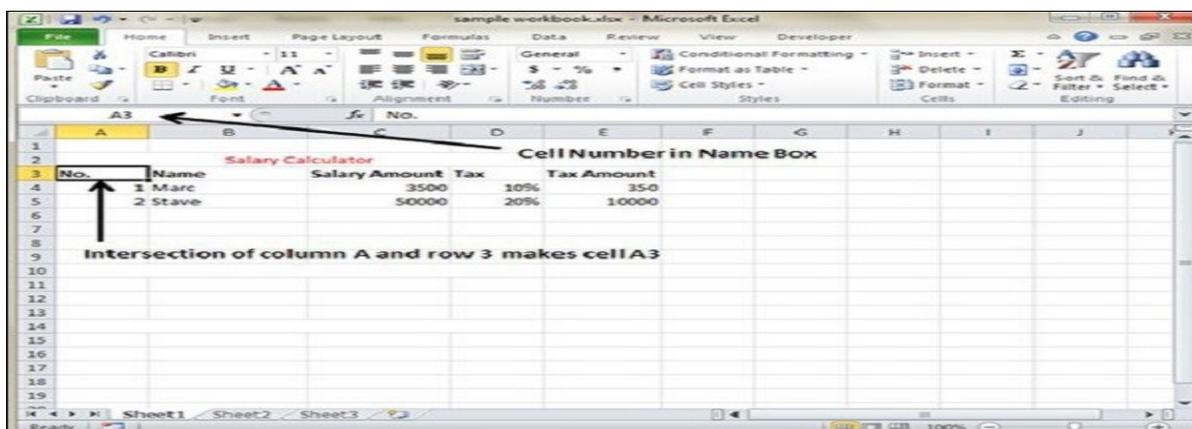

Cell Introduction

The intersection of rows and columns is called **cell**.

Cell is identified with **Combination of column header and row number**.

For example − A1, A2.

Copy & Paste in Excel 2010

MS Excel provides **copy paste** option in different ways. The simplest method of copy paste is as below.

Copy Paste

- To copy and paste, just select the cells you want to copy. Choose **copy option** after right click or press **Control + C**.

- Select the cell where you need to paste this copied content. Right click and select paste option or press **Control + V**.
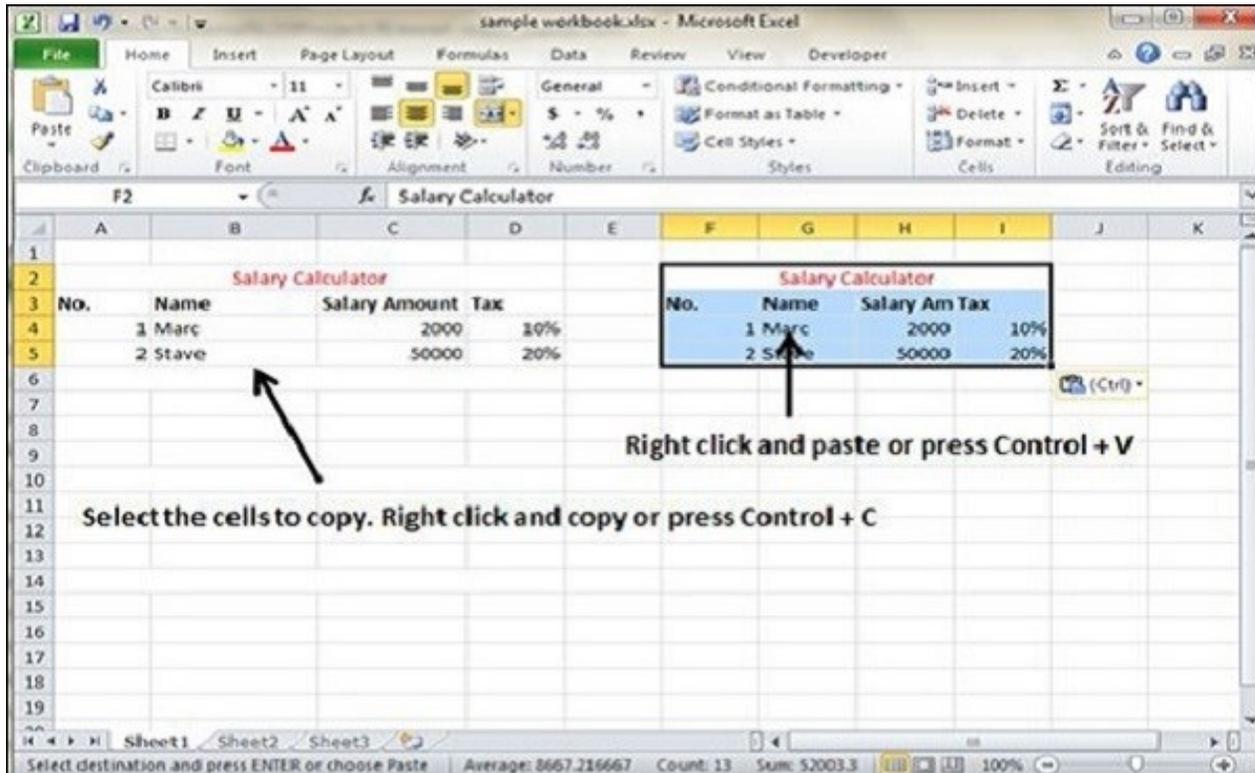
In this case, **MS Excel** will copy everything such as values, formulas, Formats, Comments and validation. MS Excel will overwrite the content with paste. If you want to undo this, press **Control + Z** from the keyboard.
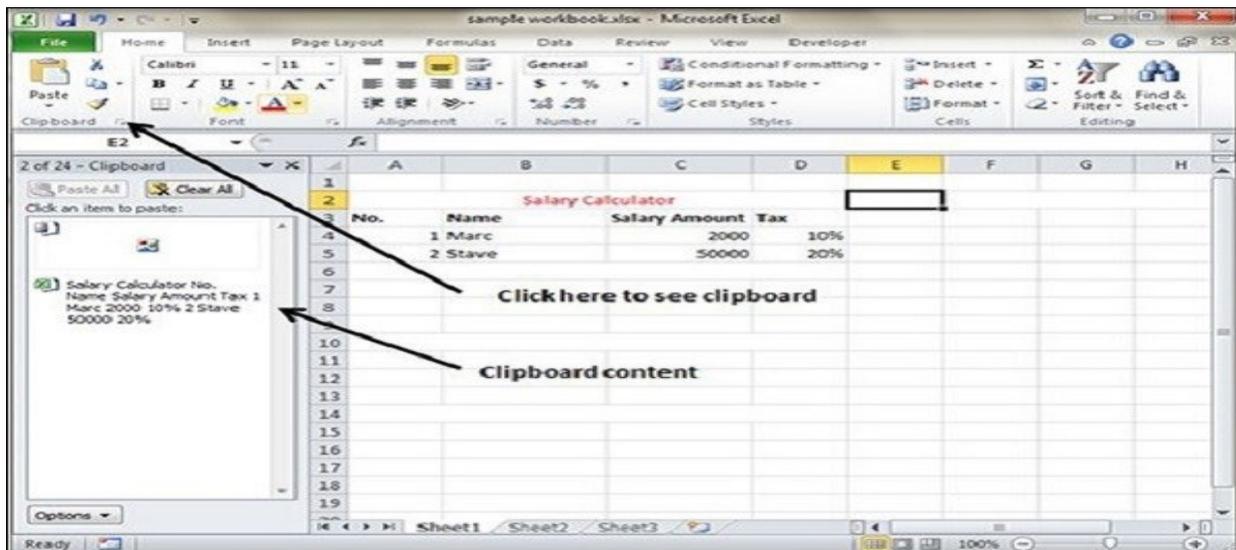
Copy Paste using Office Clipboard

When you copy data in MS Excel, it puts the copied content in Windows and Office Clipboard.

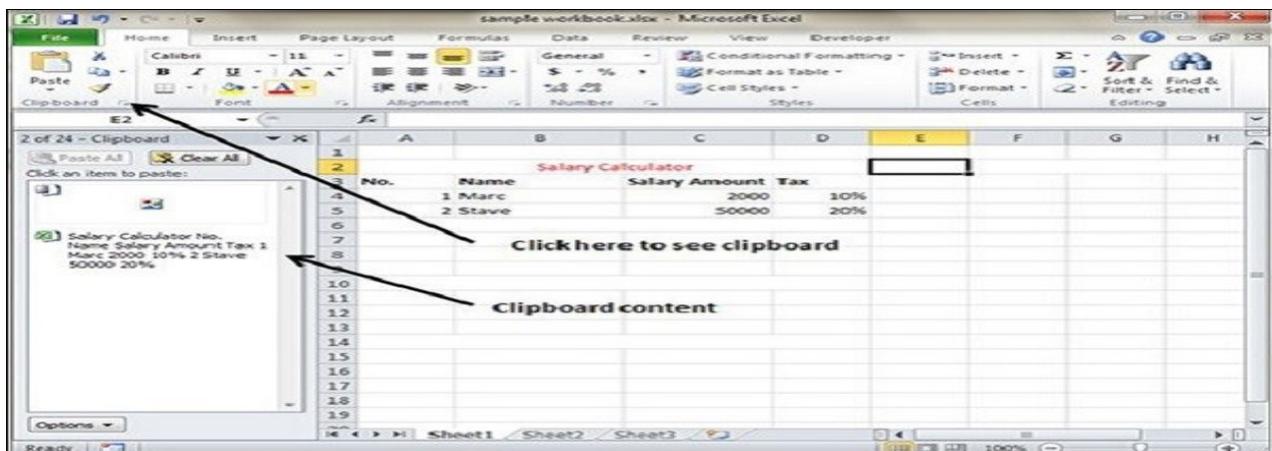You can view the clipboard content by **Home → Clipboard**.

View the clipboard content. Select the cell where you need to paste.

Click on paste, to paste the content.

Copy Paste in Special way

You may not want to copy everything in some cases. For example, you want to copy only Values or you want to copy only the formatting of cells. Select the paste special option as shown below.

Below are the various options available in paste special.

- **All** − Pastes the cell's contents, formats, and data validation from the Windows Clipboard.

- **Formulas** − Pastes formulas, but not formatting.

- **Values** − Pastes only values not the formulas.

- **Formats** − Pastes only the formatting of the source range.

- **Comments** − Pastes the comments with the respective cells.

- **Validation** − Pastes validation applied in the cells.

- **All using source theme** − Pastes formulas, and all formatting.

- **All except borders** − Pastes everything except borders that appear in the source range.

- **Column Width** − Pastes formulas, and also duplicates the column width of the copied cells.

- **Formulas & Number Formats** − Pastes formulas and number formatting only.

- **Values & Number Formats** –

Pastes the results of formulas, plus the number.

- **Merge Conditional Formatting** –

  This icon is displayed only when the copied cells contain conditional formatting. When clicked, it merges the copied conditional formatting with any conditional formatting in the destination range.

- **Transpose** –

  Changes the orientation of the copied range. Rows become columns, and columns become rows. Any formulas in the copied range are adjusted so that they work properly when transposed.

# WEEK-5

Various Formatting Styles in Ms Excel

**BUILDING FORMULAS:**

Functions in Formula:

Many formulas you create use available worksheet functions. These functions enable you to greatly enhance the power of your formulas and perform calculations that are difficult if you use only the operators. For example, you can use the LOG or SIN function to calculate the Logarithm or Sin ratio. You can't do this complicated calculation by using the mathematical operators alone.

Using Functions

When you type = sign and then type any alphabet you will see the searched functions as below.

Typing M will show number of functions starting with M
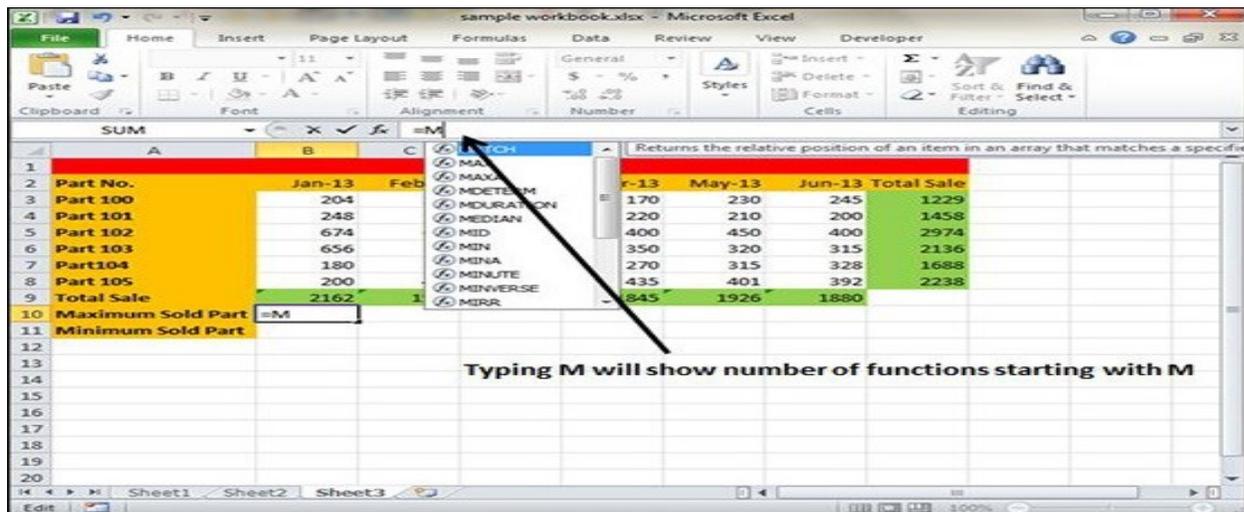
Suppose you need to determine the largest value in a range. A formula can't tell you the answer without using a function. We will use formula that uses the MAX function to return the largest value in the range B3:B8 as **=MAX(A1:D100)**.

Max function is used in Formula Bar
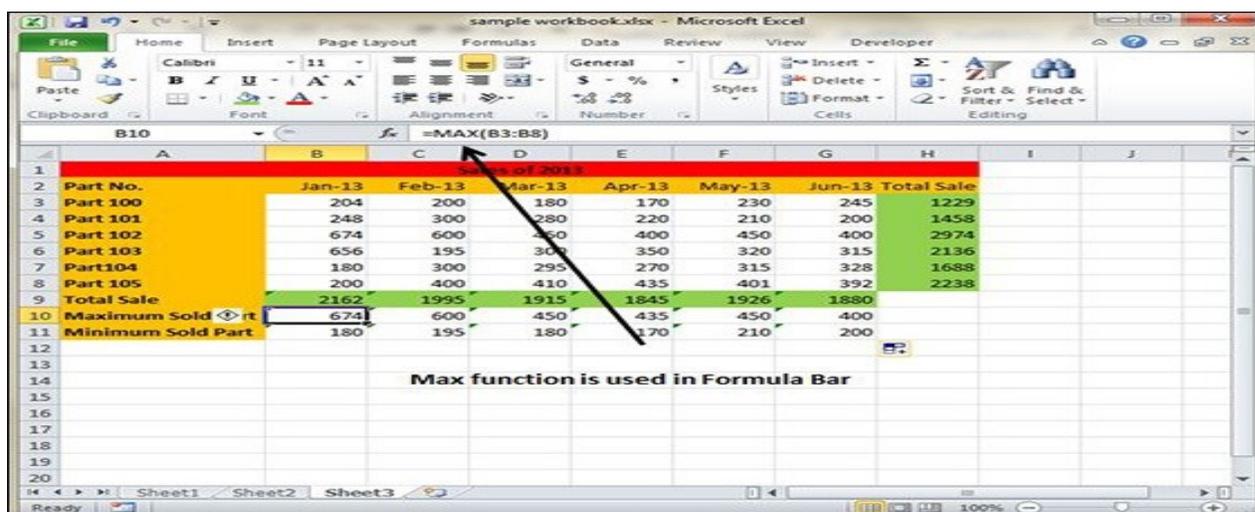
Another example of functions. Suppose you want to find if the cell of month is greater than 1900 then we can give Bonus to Sales representative. The we can achieve it with writing formula with IF functions as **=IF(B9>1900,"Yes","No")**
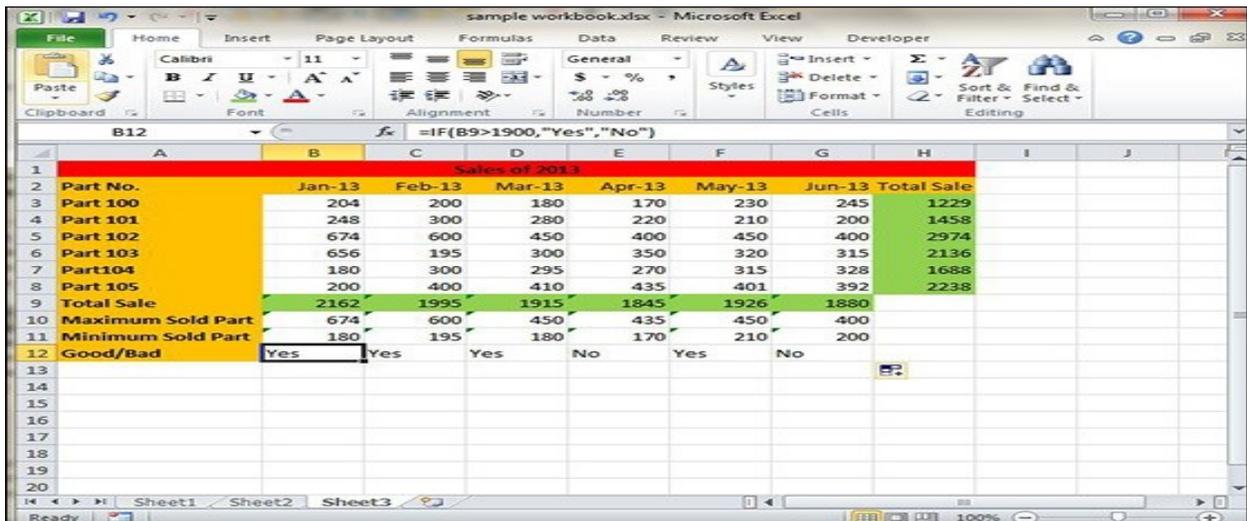
Function Arguments

In the above examples, you may have noticed that all the functions used parentheses. The information inside the parentheses is the list of arguments.

Functions vary in how they use arguments. Depending on what it has to do, a function may use.

- **No arguments** − Examples − Now(), Date(), etc.

- **One argument** − UPPER(), LOWER(), etc.

- **A fixed number of arguments** − IF(), MAX(), MIN(), AVERGAGE(), etc.

- **Infinite number of arguments**

- **Optional arguments**

Built In Functions

MS Excel has many built in functions, which we can use in our formula. To see all the functions by category, choose **Formulas Tab » Insert Function.** Then Insert function Dialog appears from which we can choose the function.
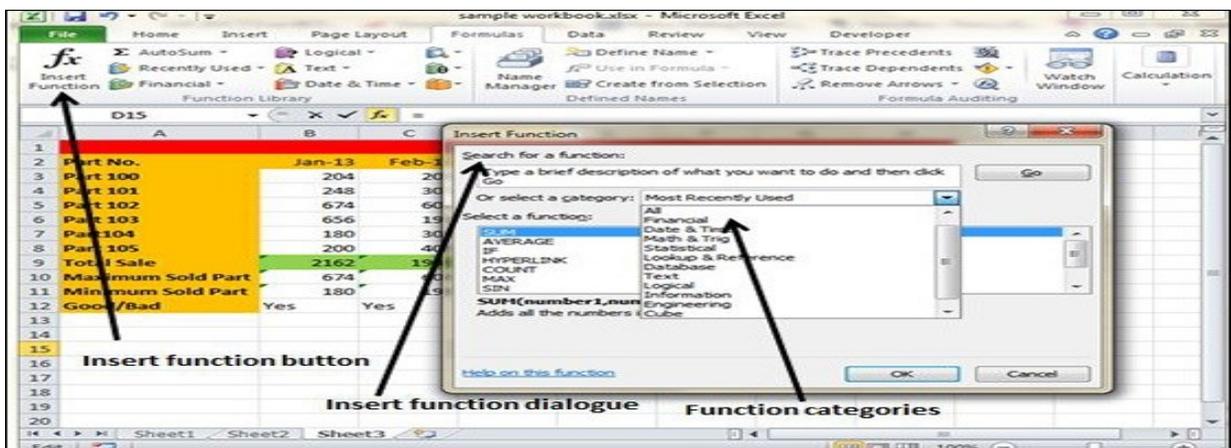
Functions by Categories

Let us see some of the built in functions in MS Excel.

- **Text Functions**
    - **LOWER** − Converts all characters in a supplied text string to lower case
    - **UPPER** − Converts all characters in a supplied text string to upper case
    - **TRIM** − Removes duplicate spaces, and spaces at the start and end of a text string
    - **CONCATENATE** − Joins together two or more text strings.
    - **LEFT** − Returns a specified number of characters from the start of a supplied text string.
    - **MID** − Returns a specified number of characters from the middle of a supplied text string
    - **RIGHT** − Returns a specified number of characters from the end of a supplied text string.
    - **LEN** − Returns the length of a supplied text string
    - **FIND** − Returns the position of a supplied character or text string from within a supplied text string (case-sensitive).

- **Date & Time**
    - **DATE** − Returns a date, from a user-supplied year, month and day.
    - **TIME** − Returns a time, from a user-supplied hour, minute and second.
    - **DATEVALUE** − Converts a text string showing a date, to an integer that represents the date in Excel's date-time code.
    - **TIMEVALUE** − Converts a text string showing a time, to a decimal that represents the time in Excel.
    - **NOW** − Returns the current date & time.
    - **TODAY** − Returns today's date.

- **Statistical**
    - **MAX** − Returns the largest value from a list of supplied numbers.
    - **MIN** − Returns the smallest value from a list of supplied numbers.
    - **AVERAGE** − Returns the Average of a list of supplied numbers.
    - **COUNT** − Returns the number of numerical values in a supplied set of cells or values.
    - **COUNTIF** − Returns the number of cells (of a supplied range), that satisfies a given criteria.
    - **SUM** − Returns the sum of a supplied list of numbers
    - **Logical**

o   **AND** − Tests a number of user-defined conditions and returns TRUE if ALL of the conditions evaluate to TRUE, or FALSE otherwise

o   **OR** − Tests a number of user-defined conditions and returns TRUE if ANY of the conditions evaluate to TRUE, or FALSE otherwise.

- NOT − Returns a logical value that is the opposite of a user supplied logical value or expression i.e. returns FALSE if the supplied argument is TRUE and returns TRUE if the supplied argument is FAL

- **Math & Trig**

  - **ABS** − Returns the absolute value (i.e. the modulus) of a supplied number.

  - **SIGN** − Returns the sign (+1, -1 or 0) of a supplied number.

  - **SQRT** − Returns the positive square root of a given number.

  - **MOD** − Returns the remainder from a division between two supplied numbers.

AUTO SUM FEATURE IN MS EXCEL

Excel The AutoSum feature makes it very easy to total rows and columns using the SUM worksheet function.
There is a special command button on the standard toolbar that will allow you insert the SUM function very quickly.
This command button is known as the **AutoSum button.**

You can quickly enter the AVERAGE, COUNT, MAX or MIN functions by expanding the drop-down menu.
The "More Functions" button displays the **(Insert > Function)** dialog box.
You can also use the shortcut key **(Alt + =)** to quickly sum the adjacent cells.

Summing a vertical block of numbers
Enter your numbers in a single column into consecutive cells.
Select the cell directly below your list and press the AutoSum button on the standard toolbar.
The SUM() function will be entered automatically and the cells which are going to be include are highlighted with a dotted line. Press Enter to confirm.

The SUM function is inserted automatically and the corresponding range of cells is entered.

Summing a horizontal block of numbers
Enter your number in a single row into consecutive cells.
Select the cell directly to the right of your list and press the AutoSum button on the standard

toolbar.
The SUM() function will be entered automatically and the cells which are going to be include are highlighted with a dotted line. Press Enter to confirm.

	A	B	C	D	E	F	G	H	I
1									
2		10	20	30	40	=SUM(B2:E2)			
3						SUM(**number1**, [number2], ...)			
4									

Summing multiple columns of numbers

If you have several columns of data and would like to sum all the individual columns separately you can highlight the cells before pressing the AutoSum button.
Enter some numbers into the cell range "B2:C5".
Highlight the cell range directly below "B6:C6" and press the AutoSum button.

	A	B	C	D
1				
2		10	1	
3		20	2	
4		30	3	
5		40	4	
6				
7				

	A	B	C	D
1				
2		10	1	
3		20	2	
4		30	3	
5		40	4	
6		100	10	
7				

Summing multiple rows of numbers

If you have several rows of data it is also possible to sum all the individual rows (or columns) separately.
Enter some numbers into the cell range "B2:E3".
Highlight the cell range directly on the left "F2:F3" and press the AutoSum button.

	A	B	C	D	E	F	G
1							
2		10	20	30	40		
3		1	2	3	4		
4							

	A	B	C	D	E	F	G
1							
2		10	20	30	40	100	
3		1	2	3	4	10	
4							

Important

If the suggested range of cells is not correct you can just drag the range to the correct cells.
AutoSum will only include cells that contain a value. If any empty cells appears in a column or row then only the cells after this will be included.
(Alt + =) - Enters the SUM() function using the adjacent range of cells.

CONDITIONAL FORMATTING

MS Excel 2010 Conditional Formatting feature enables you to format a range of values so that the values outside certain limits, are automatically formatted.

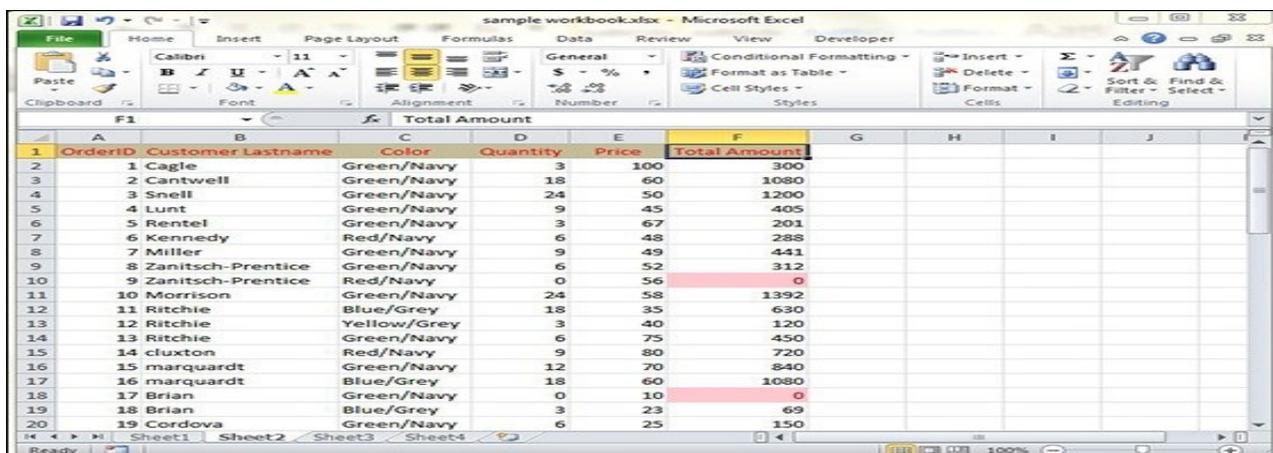Choose **Home Tab » Style group » Conditional Formatting dropdown**.

Various Conditional Formatting Options

- **Highlight Cells Rules** − It opens a continuation menu with various options for defining the formatting rules that highlight the cells in the cell selection that contain certain values, text, or dates, or that have values greater or less than a particular value, or that fall within a certain ranges of values.

Suppose you want to find cell with Amount 0 and Mark them as red.Choose Range of cell » Home Tab » Conditional Formatting DropDown » Highlight Cell Rules » Equal To.
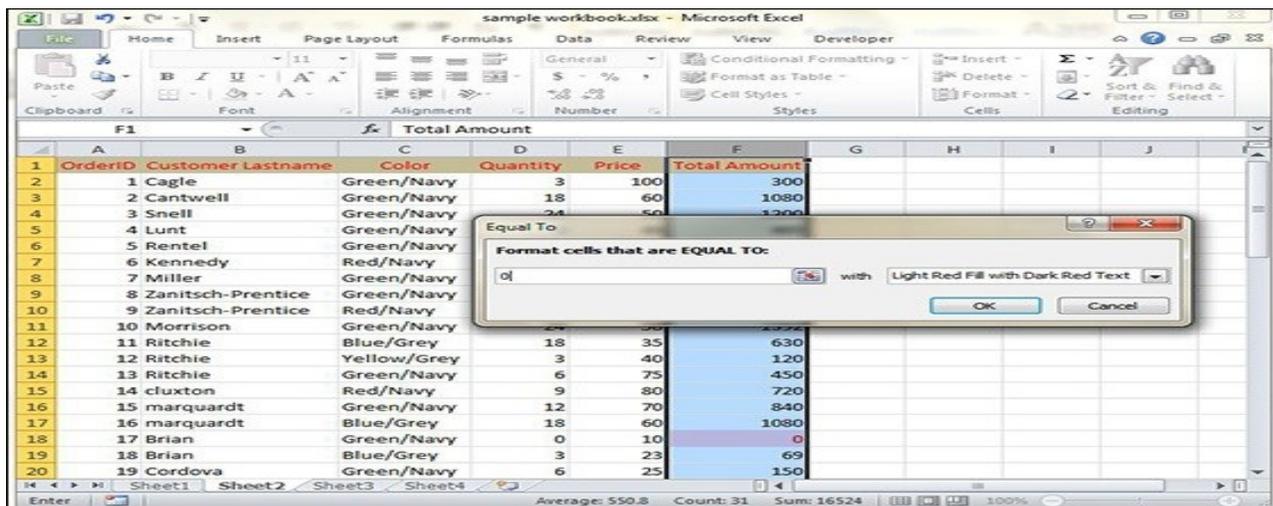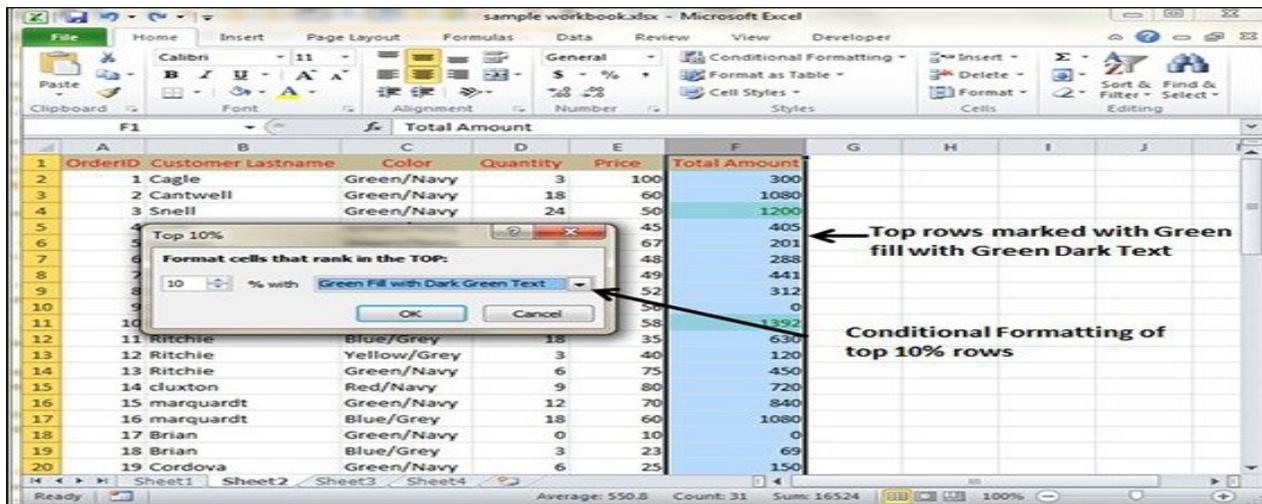

After Clicking ok, the cells with value zero are marked as red.

- **Top/Bottom Rules** − It opens a continuation menu with various options for defining the formatting rules that highlight the top and bottom values, percentages, and above and below average values in the cell selection.

Suppose you want to highlight the top 10% rows you can do this with these Top/Bottom rules.

- **Data Bars** − It opens a palette with different color data bars that you can apply to the cell selection to indicate their values relative to each other by clicking the data bar thumbnail.

With this conditional Formatting data Bars will appear in each cell.
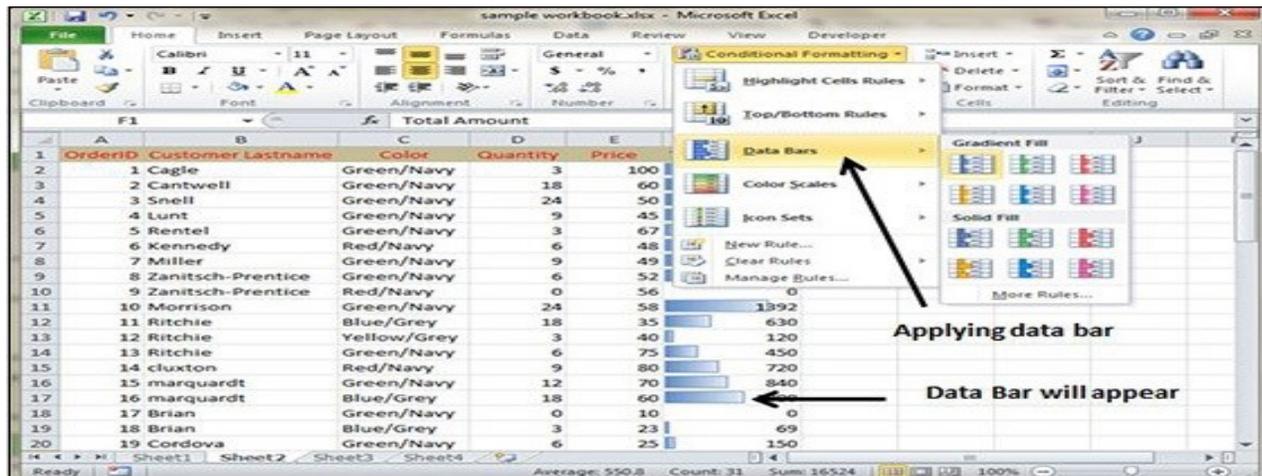
- **Color Scales** − It opens a palette with different three- and two-colored scales that you can apply to the cell selection to indicate their values relative to each other by clicking the color scale thumbnail.

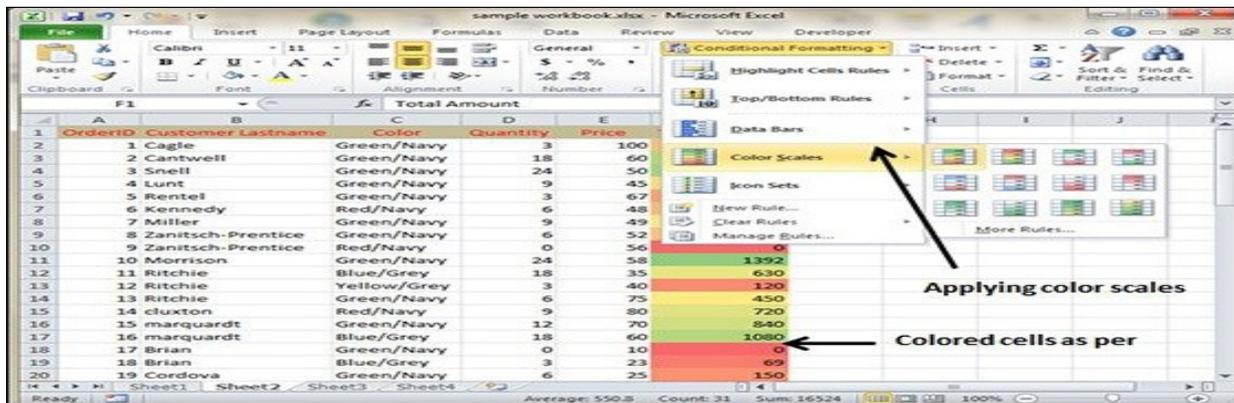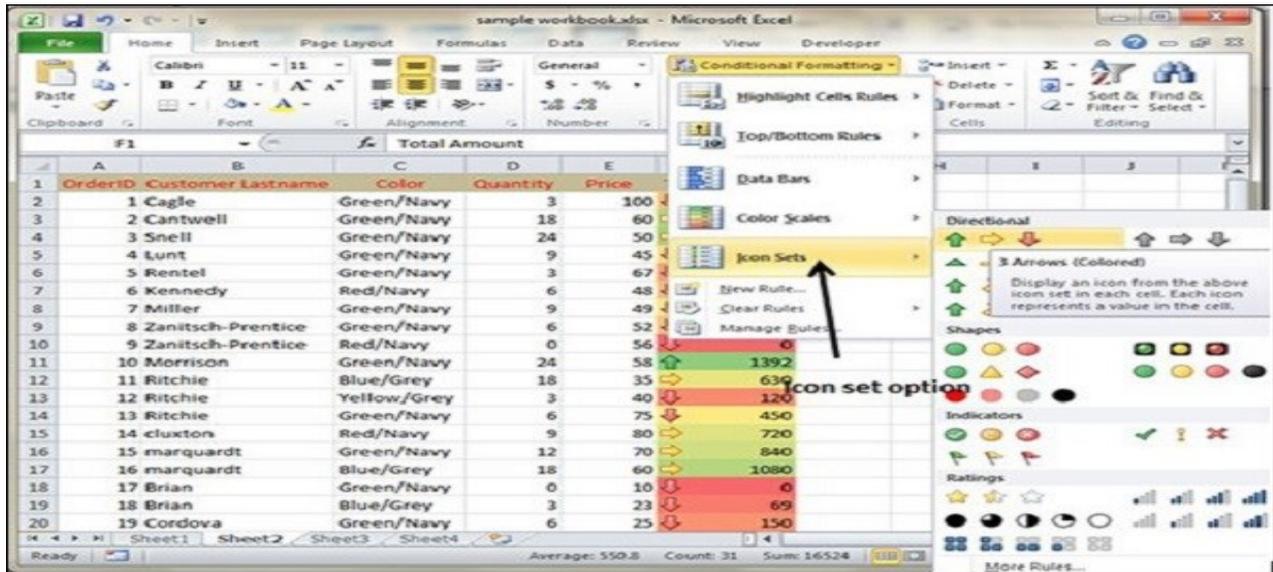See the below screenshot with Color Scales, conditional formatting applied.

- **Icon Sets** − It opens a palette with different sets of icons that you can apply to the cell selection to indicate their values relative to each other by clicking the icon set.

See the below screenshot with Icon Sets conditional formatting applied.

- **New Rule** − It opens the New Formatting Rule dialog box, where you define a custom conditional formatting rule to apply to the cell selection.

- **Clear Rules** − It opens a continuation menu, where you can remove the conditional formatting rules for the cell selection by clicking the Selected Cells option, for the entire worksheet by clicking the Entire Sheet option, or for just the current data table by clicking the This Table option.

- **Manage Rules** − It opens the Conditional Formatting Rules Manager dialog box, where you edit and delete particular rules as well as adjust their rule precedence by moving them up or down in the Rules list box.

WORKING WITH CHARTS

To create a line chart, execute the following steps.

1. Select the rangeA1:D7.

2. On the Insert tab, in the Charts group, choose Line, and select Line withMarkers.
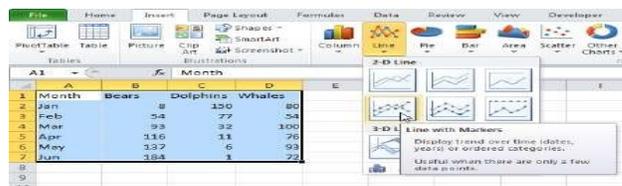
Result:

Change Chart Type

You can easily change to a different type of chart at any time.

1. Select thechart.

2. On the Insert tab, in the Charts group, choose Column, and select Clustered Column.

WEEK-6
Working with text and lookup functions

TEXT FUNCTIONS

The data that you obtain from different sources many not be in a form ready for analysis. In this chapter, you will understand how to prepare your data that is in the form of text for analysis.
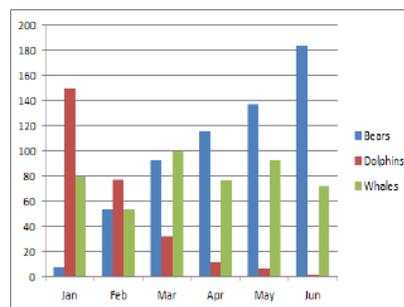
Initially, you need to clean the data. Data cleaning includes removing unwanted characters from text. Next, you need to structure the data in the form you require for further analysis. You can do the same by −

- Finding required text patterns with the text functions.
- Extracting data values from text.
- Formatting data with text functions.
- Executing data operations with the text functions.

Removing Unwanted Characters from Text

When you import data from another application, it can have nonprintable characters and/or excess spaces. The excess spaces can be −

- leading spaces, and/or
- extra spaces between words.

If you sort or analyze such data, you will get erroneous results.

Consider the following example −

```
                    Product Data

54482100AFES | CONTROLLER SERVER 1TB H | 304.00
   54482100JCP9 | DESKTOP UNIT | 225.00
   54482700□BAAS | DESKTOP WINDOWS 8.1 SERVER | 2302.00
   54482600□BAAS | DESKTOP WINDOWS 8.1 WKST | 355.00
    54482100□BAAS | DESKTOP WINDOWS 10| 182.00
   54482200□BAAS | DESKTOP WINDOWS DESKTOP OS | 255.00
   54482500□BAAS | DESKTOP WINDOWS OS | 354.00
   54483000□BAAS | MINITOWER NO OS | 1840.00
   54483000KEBB | MINI TOWER | 2550.00
```

This is the raw data that you have obtained on product information containing the Product ID, Product description and the price. The character "|" separates the field in each row.

When you import this data into Excel worksheet, it looks as follows −

A	B
1	
2	**Product Data**
3	54482100AFES | CONTROLLER SERVER 1TB H | 304.00
4	54482100JCP9 | DESKTOP UNIT | 225.00
5	544827000BAAS | DESKTOP WINDOWS 8.1 SERVER | 2302.00
6	544826000BAAS | DESKTOP WINDOWS 8.1 WKST | 355.00
7	544821000BAAS | DESKTOP WINDOWS 10| 182.00
8	544822000BAAS | DESKTOP WINDOWS DESKTOP OS | 255.00
9	544825000BAAS | DESKTOP WINDOWS OS | 354.00
10	544830000BAAS | MINITOWER NO OS | 1840.00
11	54483000KEBB | MINI TOWER | 2550.00

As you observe, the entire data is in a single column. You need to structure this data to perform data analysis. However, initially you need to clean the data.

You need to remove any nonprintable characters and excess spaces that might be present in the data. You can use the CLEAN function and TRIM function for this purpose.

S.No.	Function & Description
1.	**CLEAN** Removes all nonprintable characters from text
2.	**TRIM** Removes spaces from text

- Select the Cells C3 – C11.
- Type =TRIM (CLEAN (B3)) and then press CTRL + Enter.

The formula is filled in the cells C3 – C11.

A	B	C
1		
2	**Product Data**	**Data Cleaning**
3	54482100AFES | CONTROLLER SERVER 1TB H | 304.00	=TRIM(CLEAN(B3))
4	54482100JCP9 | DESKTOP UNIT | 225.00	=TRIM(CLEAN(B4))
5	544827000BAAS | DESKTOP WINDOWS 8.1 SERVER | 2302.00	=TRIM(CLEAN(B5))
6	544826000BAAS | DESKTOP WINDOWS 8.1 WKST | 355.00	=TRIM(CLEAN(B6))
7	544821000BAAS | DESKTOP WINDOWS 10| 182.00	=TRIM(CLEAN(B7))
8	544822000BAAS | DESKTOP WINDOWS DESKTOP OS | 255.00	=TRIM(CLEAN(B8))
9	544825000BAAS | DESKTOP WINDOWS OS | 354.00	=TRIM(CLEAN(B9))
10	544830000BAAS | MINITOWER NO OS | 1840.00	=TRIM(CLEAN(B10))
11	54483000KEBB | MINI TOWER | 2550.00	=TRIM(CLEAN(B11))

The result will be as shown below −

Finding required Text Patterns with the Text Functions

To structure your data, you might have to do certain Text Pattern matching based on which you can extract the Data Values. Some of the Text Functions that are useful for this purpose are −

S.No.	Function & Description
1.	**EXACT** Checks to see if two text values are identical
2.	**FIND** Finds one text value within another (case-sensitive)
3.	**SEARCH** Finds one text value within another (not case-sensitive)

LOOKUP FUNCTIONS

You can use Excel functions to −

- Find values in a range of data - VLOOKUP and HLOOKUP
- Obtain a value or the reference to a value from within a table or range - INDEX
- Obtain the relative position of a specified item in a range of cells - MATCH

You can also combine these functions to get the required results based on the inputs you have.

Using VLOOKUP Function

The syntax of the VLOOKUP function is

VLOOKUP (lookup_value, table_array, col_index_num, [range_lookup])

Where

- **lookup_value** − is the value you want to look up. Lookup_value can be a value or a reference to a cell. Lookup_value must be in the first column of the range of cells you specify in table_array

- **table_array** − is the range of cells in which the VLOOKUP will search for the lookup_value and the return value. table_array must contain

  o the lookup_value in the first column, and

  o the return value you want to find

Note − The first column containing the lookup_value can either be sorted in ascending order or not. However, the result will be based on the order of this column.

- **col_index_num** − is the column number in the table_array that contains the return value. The numbers start with 1 for the left-most column of table-array

- **range_lookup** − is an optional logical value that specifies whether you want VLOOKUP to find an exact match or an approximate match. range_lookup can be

  o omitted, in which case it is assumed to be TRUE and VLOOKUP tries to find an approximate match

  o TRUE, in which case VLOOKUP tries to find an approximate match. In other words, if an exact match is not found, the next largest value that is less than lookup_value is returned

  o FALSE, in which case VLOOKUP tries to find an exact match

  o 1, in which case it is assumed to be TRUE and VLOOKUP tries to find an approximate match

  o 0, in which case it is assumed to be FALSE and VLOOKUP tries to find an exact match

Note − If range_lookup is omitted or TRUE or 1, VLOOKUP works correctly only when the first column in table_array is sorted in ascending order. Otherwise, it may result in incorrect values. In such a case, use FALSE for range_lookup.

Using VLOOKUP Function with range_lookup TRUE

Consider a list of student marks. You can obtain the corresponding grades with VLOOKUP from an array containing the marks intervals and pass category.

table_array −

Student Grades	
Marks	**Pass Category**
0	Fail
35	Third Class
50	Second Class
60	First Class
75	First Class with Distinction

Note that the first column marks based on which the grades are obtained is sorted in ascending order. Hence, using TRUE for range_lookup argument you can get approximate match that is what is required.

Name this array as **Grades**.

It is a good practice to name arrays in this way so that you need not remember the cell ranges. Now, you are ready to look up the grade for the list of marks you have as follows −

	A	B	C	D	E	F
1						
2		Exam Results			Student Grades	
3		Marks	Pass Category		Marks	Pass Category
4		85	=VLOOKUP(B4,Grades,2,TRUE)		0	Fail
5		75	=VLOOKUP(B5,Grades,2,TRUE)		35	Third Class
6		72	=VLOOKUP(B6,Grades,2,TRUE)		50	Second Class
7		55	=VLOOKUP(B7,Grades,2,TRUE)		60	First Class
8		68	=VLOOKUP(B8,Grades,2,TRUE)		75	First Class with Distinction
9		34	=VLOOKUP(B9,Grades,2,TRUE)			
10		60	=VLOOKUP(B10,Grades,2,TRUE)			table_array
11		50	=VLOOKUP(B11,Grades,2,TRUE)			
12		98	=VLOOKUP(B12,Grades,2,TRUE)			
13		59	=VLOOKUP(B13,Grades,2,TRUE)			VLOOKUP Function
14		74	=VLOOKUP(B14,Grades,2,TRUE)			
15		99	=VLOOKUP(B15,Grades,2,TRUE)			
16		40	=VLOOKUP(B16,Grades,2,TRUE)			
17		35	=VLOOKUP(B17,Grades,2,TRUE)			

As you can observe,

- **col_index_num** − indicates the column of the return value in table_array is 2

- the **range_lookup** is TRUE

o   The first column containing the lookup value in the table_array grades is in ascending order. Hence, the results will be correct.

o   You can get the return value for approximate matches also. i.e. VLOOKUP computes as follows −

Marks	Pass Category
< 35	Fail
>= 35 and < 50	Third Class
>= 50 and < 60	Second Class

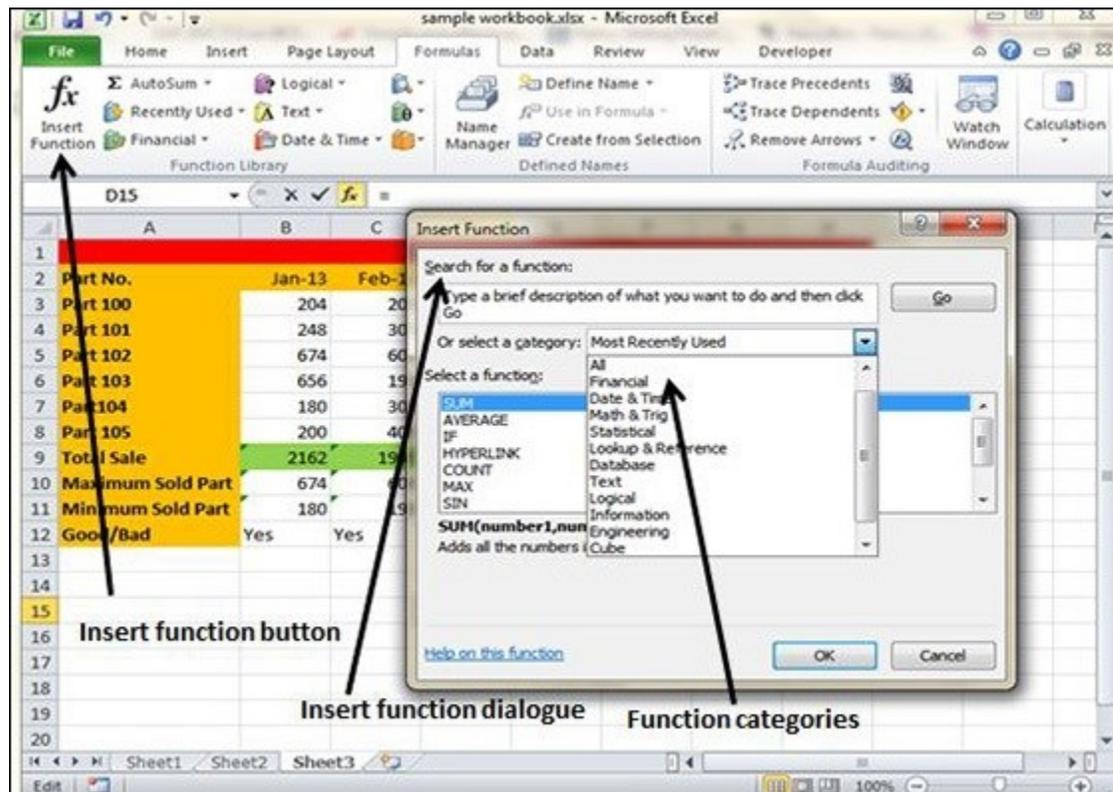|	
>=60 and < 75	First Class
>= 75	First Class with Distinction

WEEK-7
Working with Functions

BUILT IN FUNCTIONS

MS Excel has many built in functions, which we can use in our formula. To see all the functions by category, choose **Formulas Tab » Insert Function.** Then Insert function Dialog appears from which we can choose the function.

Functions by Categories

Let us see some of the built in functions in MS Excel.

- **Text Functions**

o **LOWER** − Converts all characters in a supplied text string to lower case

o **UPPER** − Converts all characters in a supplied text string to upper case

o **TRIM** − Removes duplicate spaces, and spaces at the start and end of a text string

o **CONCATENATE** − Joins together two or more text strings.

o **LEFT** − Returns a specified number of characters from the start of a supplied text string.

o **MID** − Returns a specified number of characters from the middle of a supplied text string

o **RIGHT** − Returns a specified number of characters from the end of a supplied text string.

o **LEN** − Returns the length of a supplied text string

o **FIND** − Returns the position of a supplied character or text string from within a supplied text string (case-sensitive).

- **Date & Time**

o **DATE** − Returns a date, from a user-supplied year, month and day.

o **TIME** − Returns a time, from a user-supplied hour, minute and second.

o **DATEVALUE** − Converts a text string showing a date, to an integer that represents the date in Excel's date-time code.

o **TIMEVALUE** − Converts a text string showing a time, to a decimal that represents the time in Excel.

o **NOW** − Returns the current date & time.

o **TODAY** − Returns today's date.

- **Statistical**

o **MAX** − Returns the largest value from a list of supplied numbers.

o **MIN** − Returns the smallest value from a list of supplied numbers.

o **AVERAGE** − Returns the Average of a list of supplied numbers.

o **COUNT** − Returns the number of numerical values in a supplied set of cells or values.

o **COUNTIF** − Returns the number of cells (of a supplied range), that satisfies a given criteria.

o **SUM** − Returns the sum of a supplied list of numbers

- **Logical**

o **AND** − Tests a number of user-defined conditions and returns TRUE if ALL of the conditions evaluate to TRUE, or FALSE otherwise

o **OR** − Tests a number of user-defined conditions and returns TRUE if ANY of the conditions evaluate to TRUE, or FALSE otherwise.

o **NOT** − Returns a logical value that is the opposite of a user supplied logical value or expression i.e. returns FALSE if the supplied argument is TRUE and returns TRUE if the supplied argument is FAL

- **Math & Trig**

o **ABS** − Returns the absolute value (i.e. the modulus) of a supplied number.

o **SIGN** − Returns the sign (+1, -1 or 0) of a supplied number.

o **SQRT** − Returns the positive square root of a given number.

o **MOD** − Returns the remainder from a division between two supplied numbers.

WEEK-8

Data Analysis with Ms Excel

DATA ANALYSIS - OVERVIEW

Data Analysis is a process of inspecting, cleaning, transforming and modeling data with the goal of discovering useful information, suggesting conclusions and supporting decision-making

.

Types of Data Analysis

Several data analysis techniques exist encompassing various domains such as business, science, social science, etc. with a variety of names. The major data analysis approaches are −

- Data Mining
- Business Intelligence
- Statistical Analysis
- Predictive Analytics
- Text Analytics

Data Mining

Data Mining is the analysis of large quantities of data to extract previously unknown, interesting patterns of data, unusual data and the dependencies. Note that the goal is the extraction of patterns and knowledge from large amounts of data and not the extraction of data itself.

Data mining analysis involves computer science methods at the intersection of the artificial intelligence, machine learning, statistics, and database systems.

The patterns obtained from data mining can be considered as a summary of the input data that can be used in further analysis or to obtain more accurate prediction results by a decision support system.

Business Intelligence

Business Intelligence techniques and tools are for acquisition and transformation of large amounts of unstructured business data to help identify, develop and create new strategic business opportunities.

The goal of business intelligence is to allow easy interpretation of large volumes of data to identify new opportunities. It helps in implementing an effective strategy based on insights that can provide businesses with a competitive market-advantage and long-term stability.

Statistical Analysis

Statistics is the study of collection, analysis, interpretation, presentation, and organization of data.

In data analysis, two main statistical methodologies are used −

- Descriptive statistics − In descriptive statistics, data from the entire population or a sample is summarized with numerical descriptors such as −

o Mean, Standard Deviation for Continuous Data

o Frequency, Percentage for Categorical Data

- Inferential statistics − It uses patterns in the sample data to draw inferences about the represented population or accounting for randomness. These inferences can be −

  o answering yes/no questions about the data (hypothesis testing)

  o estimating numerical characteristics of the data (estimation)

  o describing associations within the data (correlation)

  o modeling relationships within the data (E.g. regression analysis)

Predictive Analytics

Predictive Analytics use statistical models to analyze current and historical data for forecasting (predictions) about future or otherwise unknown events. In business, predictive analytics is used to identify risks and opportunities that aid in decision-making.

Text Analytics

Text Analytics, also referred to as Text Mining or as Text Data Mining is the process of deriving high-quality information from text. Text mining usually involves the process of structuring the input text, deriving patterns within the structured data using means such as statistical pattern learning, and finally evaluation and interpretation of the output.

Data Analysis Process

Data Analysis is defined by the statistician John Tukey in 1961 as "Procedures for analyzing data, techniques for interpreting the results of such procedures, ways of planning the gathering of data to make its analysis easier, more precise or more accurate, and all the machinery and results of (mathematical) statistics which apply to analyzing data."

Thus, data analysis is a process for obtaining large, unstructured data from various sources and converting it into information that is useful for −

- Answering questions
- Test hypotheses
- Decision-making
- Disproving theories

Data Analysis with Excel

Microsoft Excel provides several means and ways to analyze and interpret data. The data can be from various sources. The data can be converted and formatted in several ways. It can be analyzed with the relevant Excel commands, functions and tools - encompassing Conditional Formatting, Ranges, Tables, Text functions, Date functions, Time functions, Financial functions, Subtotals, Quick Analysis, Formula Auditing, Inquire Tool, What-if Analysis, Solvers, Data Model, PowerPivot, PowerView, PowerMap, etc.

You will be learning these data analysis techniques with Excel as part of two parts −

- Data Analysis with Excel and
- Advanced Data Analysis with Excel

WHAT - IF ANALYSIS - DATA TABLES, SCENARIO MANAGER, GOAL SEEK

What-if analysis is the process of changing the values in cells to see how those changes will affect the outcome of formulas on the worksheet. You can use several different sets of values in one or more formulas to explore all the various results.

What-if analysis is useful in many situations while doing data analysis. For example −

- You can propose different budgets based on revenue.

- You can predict the future values based on the given historical values.

- If you are expecting a certain value as the result from a formula, you can find different sets of input values that produce the desired result.

Excel provides you with the following What-if analysis tools that can be used based on your data analysis needs −

- Data Tables
- Scenario Manager
- Goal Seek

Data Tables and Scenarios take sets of input values and project forward to determine possible results. Goal seek differs from Data Tables and Scenarios in that it takes a result and projects backwards to determine possible input values that produce that result.

In this chapter, you will understand the possible situations where you can use the Whatif Analysis tools. For details on usage of these tools, refer to the later chapters in this tutorial.

Data Tables

A **Data Table** is a range of cells in which you can change values in some of the cells and come up with different answers to a problem. For example, you might want to know how much loan you can afford for a home by analyzing different loan amounts and interest rates. You can put these different values along with the **PMT** function in a Data Table and get the desired result.

A Data Table works only with **one or two variables**, but it can accept many different values for those variables.

For the details on Data Tables, refer to the chapter – <u>What-If Analysis with Data Tables</u> in this tutorial.

Scenario Manager

A scenario is a set of values that Excel saves and can substitute automatically in cells on a worksheet.

The key features are −

- You can create and save different groups of values on a worksheet and then switch to any of these new scenarios to view different results.

- A scenario can have multiple variables, but it can accommodate only up to 32 values.

- You can also create a scenario summary report, which combines all the scenarios on one worksheet. For example, you can create several different budget scenarios that compare various possible income levels and expenses, and then create a report that lets you compare the scenarios side-by-side.

- Scenario Manager is a dialog box that allows you to save the values as a scenario and name the scenario.

For the details on Scenarios, refer to the chapter – What-If Analysis with Scenario Manager in this tutorial.

Goal Seek

Goal Seek is useful if you know the result that you want from a formula, but not sure what input value the formula needs, to get that result. For example, if you want to borrow a loan and you know the loan amount, tenure of loan and the EMI that you can pay, you can use Goal Seek to find the interest rate at which you can avail the loan.

Goal Seek can be used only with one variable input value. If you have more than one variable for input values, you can use the Solver add-in.

For details on the usage of Goal Seek, refer to the chapter – What-If Analysis with Goal Seek in this tutorial.

Solver

Solver comes with Excel as an add-in. You can use Solver to find an optimal value for a formula in a cell called the target cell on a worksheet.

Solver works with a group of cells that are related to the formula in the target cell. Solver adjusts the values in the adjustable cells that you specify, to produce the result that you specify, from the target cell formula.

<center>What-If Analysis with Data Tables</center>

With a Data Table in Excel, you can easily vary one or two inputs and perform What-if analysis. A Data Table is a range of cells in which you can change values in some of the cells and come up with different answers to a problem.

There are two types of Data Tables −

- One-variable Data Tables
- Two-variable Data Tables

If you have more than two variables in your analysis problem, you need to use Scenario Manager Tool of Excel. For details, refer to the chapter – What-If Analysis with Scenario Manager in this tutorial.

One-variable Data Tables

A one-variable Data Table can be used if you want to see how different values of one variable in one or more formulas will change the results of those formulas. In other words, with a one-variable Data Table, you can determine how changing one input changes any number of outputs. You will understand this with the help of an example.

WEEK-9

Creation of Various Charts in Ms Excel

CREATING PIVOT TABLES AND PIVOT CHARTS
PIVOT TABLES

A pivot table is essentially a dynamic summary report generated from a database. The database can reside in a worksheet (in the form of a table) or in an external data file. A pivot table can help transform endless rows and columns of numbers into a meaningful presentation of the data. Pivot tables are very powerful tool for summarized analysis of the data.

Pivot tables are available under **Insert tab » PivotTable dropdown » PivotTable**.

Pivot Table Example

Now, let us see Pivot table with the help of example. Suppose you have huge data of voters and you want to see the summarized data of voter Information per party, then you can use the Pivot table for it. Choose **Insert tab » Pivot Table** to insert pivot table. MS Excel selects the data of the table. You can select the pivot table location as existing sheet or new sheet.
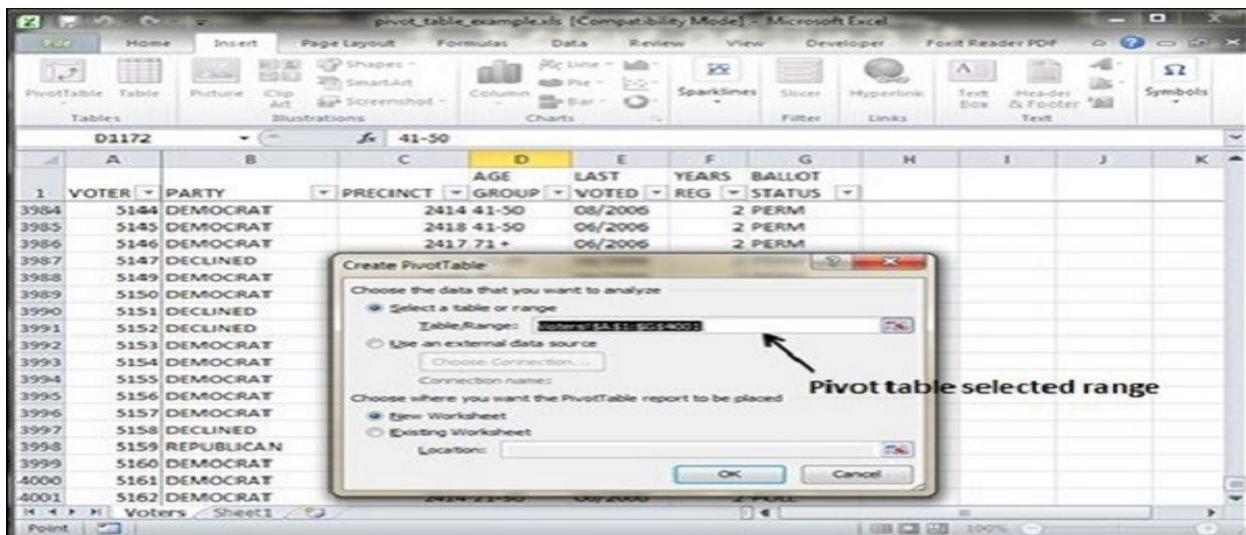
This will generate the Pivot table pane as shown below. You have various options available in the Pivot table pane. You can select fields for the generated pivot table.
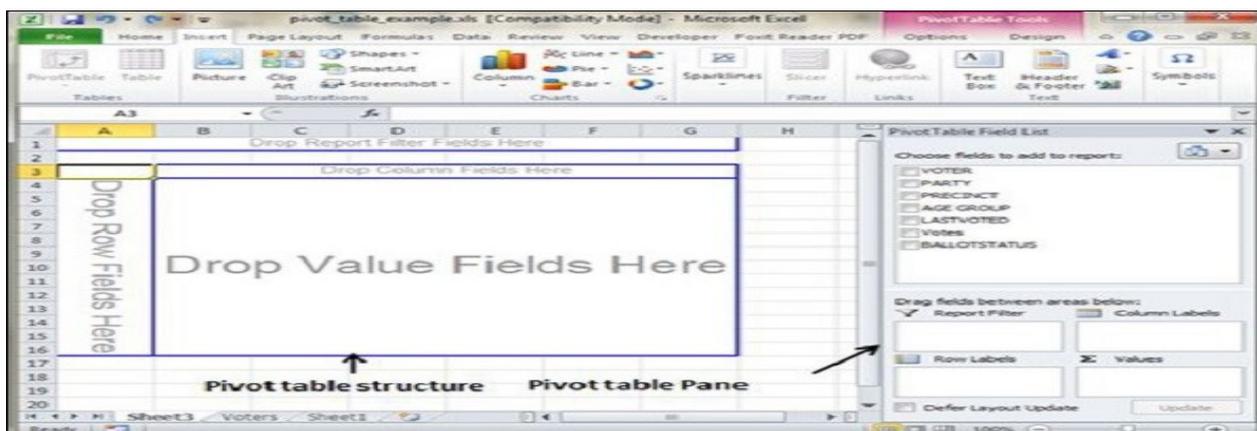
Column labels − A field that has a column orientation in the pivot table. Each item in the field occupies a column.

Report Filter − You can set the filter for the report as year, then data gets filtered as per the year.

Row labels − A field that has a row orientation in the pivot table. Each item in the field occupies a row.

Values area − The cells in a pivot table that contain the summary data. Excel offers several ways to summarize the data (sum, average, count, and so on).

After giving input fields to the pivot table, it generates the pivot table with the data as shown below.

Pivot Charts

A pivot chart is a graphical representation of a data summary, displayed in a pivot table. A pivot chart is always based on a pivot table. Although Excel lets you create a pivot table and a pivot chart at the same time, you can't create a pivot chart without a pivot table. All Excel charting features are available in a pivot chart.
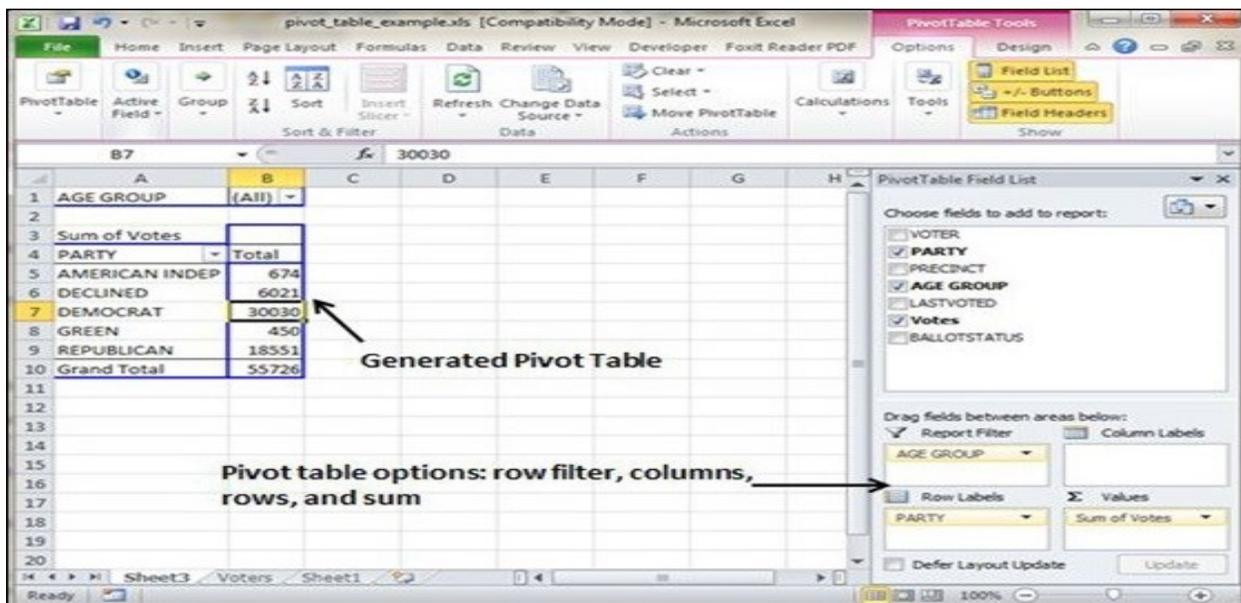
Pivot charts are available under **Insert tab » PivotTable dropdown » PivotChart**.

Pivot Chart Example

Now, let us see Pivot table with the help of an example. Suppose you have huge data of voters and you want to see the summarized view of the data of voter Information per party in the form of charts, then you can use the Pivot chart for it. Choose **Insert tab » Pivot Chart** to insert the pivot table.
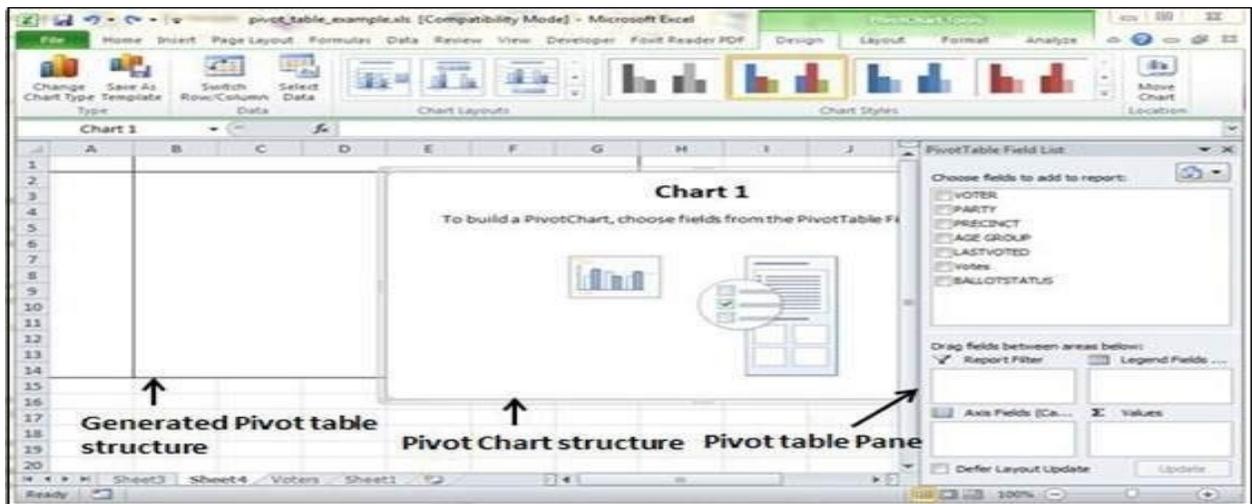
MS Excel selects the data of the table. You can select the pivot chart location as an existing sheet or a new sheet. Pivot chart depends on automatically created pivot table by the MS Excel. You can generate the pivot chart in the below screen-shot.

WEEK-10
LaTeX FORMATTING

INTRODUCTION TO LATEX

LATEX (pronounced LAY-tek or LAH-tek) is a tool used to create professional-looking documents. It is based on the WYSIWYM (what you see is what you mean) idea, meaning you only have focus on the contents of your document and the computer will take care of the formatting. Instead of spacing out text on a page to control formatting, as with Microsoft Word or LibreOffice Writer, users can enter plain text and let LATEX take care of the rest.

LATEX is used all over the world for scientific documents, books, as well as many other forms of publishing. Not only can it create beautifully typeset documents, but it allows users to very quickly tackle the more complicated parts of typesetting, such as inputting mathematics, creating tables of contents, referencing and creating bibliographies, and having a consistent layout across all sections. Due to the huge number of open source packages available (more on this later), the possibilities with LATEX are endless. These packages allow users to do even more with LATEX, such as add footnotes, draw schematics, create tables etc.

One of the most important reasons people use LATEX is that it separates the content of the document from the style. This means that once you have written the content of your document, we can change its appearance with ease. Similarly, you can create one style of document which can be used to standardise the appearance of many different documents. This allows scientific journals to create templates for submissions. These templates have a pre-made layout meaning that only the content needs to be added. In fact there are hundreds of templates available for everything from CVs to slideshows.

WRITING YOUR FIRST PIECE OF LATEX

The first step is to create a new LATEX project. You can do this on your own computer by creating a new **.tex** file

```
\documentclass{article}

\begin{document}
First document. This is a simple example, with no
extra parameters or packages included.
\end{document}
```

First document. This is a simple example, with no extra parameters or packages included.

You can see that LATEX has already taken care of the first piece of formatting for you, by indenting the first line of the paragraph.

The first line of code declares the type of document, known as the class. The class controls the overall appearance of the document. Different types of documents will require different classes i.e. a CV/resume will require a different class than a scientific paper. In this case, the class is **article**, the simplest and most common LATEX class. Other types of documents you may be working on may require different classes such as **book** or **report**.

After this, you write the content of our document, enclosed inside the **begin{document}** and **end{document}** tags. This is known as the body of the document. You can start writing here and make changes to the text if you wish. To see the result of these changes in the PDF you have to compile the document. To do this in Overleaf, simply hit **Recompile**. (You can also set your project to automatically recompile when you edit your files, by clicking on the small arrow next to the '**Recompile** button and set '**Auto Compile** to '**On**.)

If you are using a basic text editor such as gedit, emacs, vim, sublime, notepad etc., you will have to compile the document manually. To do this, simply run **pdflatex <your document>** in your computers terminal/command line. See here for more information on how to do this.

If you are using a dedicated LaTeX editor such as TeXmaker or TeXworks, simply hit the **Recompile** button. Consult the programs documentation if you are unsure of where this is.

Now that you have learnt how to add content to our document, the next step is to give it a title. To do this, we must talk briefly about the **preamble**.

THE PREAMBLE OF A DOCUMENT

In the previous example the text was entered after the **begin{document}** command. Everything in your **.tex** file before this point is called the **preamble**. In the preamble you define the type of document you are writing, the language you are writing in, the packages you would like to use (more on this later) and several other elements. For instance, a normal document preamble would look like this:

```
\documentclass[12pt, letterpaper]{article}
\usepackage[utf8]{inputenc}
```
Below a detailed description of each line:

\documentclass[12pt, letterpaper]{article}
As said before, this defines the type of document. Some additional parameters included in the square brackets brackets can be passed to the command. These parameters must be comma-separated. In the example, the extra parameters set the font size (**12pt**) and the paper size (**letterpaper**). Of course other font sizes (**9pt**, **11pt**, **12pt**) can be used, but if none is specified, the default size is **10pt**. As for the paper size other possible values are **a4paper** and **legalpaper**; see the article about Page size and margins for more details about this.
\usepackage[utf8]{inputenc}
This is the encoding for the document. It can be omitted or changed to another encoding but utf-8 is recommended. Unless you specifically need another encoding, or if you are unsure about it, add this line to the preamble.

Adding a title, author and date

To add a title, author and date to our document, you must add three lines to the **preamble** (NOT the main body of the document). These lines are

\title{First document}
This is the title.
\author{Hubert Farnsworth}

Here you put the name of the Author(s) and, as a optional parameter, you can add the next command:

\thanks{funded by the Overleaf team}

This can be added after the name of the autor, inside the braces of the **title** command. It will add a superscript and a footnote with the text inside the braces. Useful if you need to thank an institution in your article.

\date{February 2014}

You can enter the date manually or use the command **\today** so the date will be updated automatically at the time you compile your document

With these lines added, your preamble should look something like this

```
\documentclass[12pt, letterpaper, twoside]{article}
\usepackage[utf8]{inputenc}

\title{First document}
\author{Hubert Farnsworth \thanks{funded by the Overleaf team}}
\date{February 2017}
```

Now that you have given your document a title, author and date, you can print this information on the document with the **\maketitle** command. This should be included in the **body** of the document at the place you want the title to be printed.

```
\begin{document}

\maketitle

We have now added a title, author and date to our first \LaTeX{} document!

\end{document}
```

<div align="center">

My first LaTeX document

Hubert Farnsworth *

January 2017

We have now added a title, author and date to our first LaTeX document!

</div>

Adding comments

As with any code you are writing, it can often be useful to include comments. Comments are pieces of text you can include in the document which will not be printed, and will not affect the document in any way. They are useful for organizing your work, taking notes, or commenting out lines/sections when debugging. To make a comment in LATEX, simply write a **%** symbol at the beginning of the line as shown below:

```
\begin{document}

\maketitle
```

We have now added a title, author and date to our first \LaTeX{} document!

% This line here is a comment. It will not be printed in the document.

\end{document}

My first LaTeX document

Hubert Farnsworth *

January 2017

We have now added a title, author and date to our first LaTeX document!

Bold, italics and underlining

We will now look at some simple text formatting commands.

- **Bold**: Bold text in LaTeX is written with the **\textbf{...}** command.
- Italics: Italicised text in LaTeX is written with the **\textit{...}** command.
- Underline: Underlined text in LaTeX is written with the **\underline{...}** command.

An example of each of these in action is shown below:

Some of the \textbf{greatest}
discoveries in \underline{science}
were made by \textbf{\textit{accident}}.

Some of the **greatest** discoveries in science were
made by *accident*.

Another very useful command is the **\emph{...}** command. What the **\emph** command actually does with its argument depends on the context - inside normal text the emphasized text is italicized, but this behaviour is reversed if used inside an italicized text- see example below:

Some of the greatest \emph{discoveries}
in science
were made by accident.

\textit{Some of the greatest \emph{discoveries}
in science
were made by accident.}

\textbf{Some of the greatest \emph{discoveries}
in science
were made by accident.}

> Some of the greatest *discoveries* in science were
> made by accident.
> *Some of the greatest* discoveries *in science were*
> *made by accident.*
> **Some of the greatest *discoveries* in science**
> **were made by accident.**

Moreover, some packages, e.g. Beamer, change the behaviour of **\emph** command.

Adding images

We will now look at how to add images to a LATEX document. On Overleaf, you will first have to upload the images.

Below is a example on how to include a picture.

```
\documentclass{article}
\usepackage{graphicx}
\graphicspath{ {images/} }

\begin{document}
The universe is immense and it seems to be homogeneous,
in a large scale, everywhere we look at.

\includegraphics{universe}

There's a picture of a galaxy above
\end{document}
```

The universe is immense and it seems to be homogeneous, in a large scale, everywhere we look at.

There's a picture of a galaxy above

LATEX can not manage images by itself, so you will need to use a package. Packages can be used to change the default look of your LATEX document, or to allow more functionalities. In this case, you need to include an image in our document, so you should use the **graphicx** package. This package gives new commands, **\includegraphics{...}** and **\graphicspath{...}**. To use the **graphicx** package, include the following line in you preamble: **\usepackage{graphicx}**

The command **\graphicspath{ {images/} }** tells LATEX that the images are kept in a folder named images under the current directory.

The **\includegraphics{universe}** command is the one that actually included the image in the document. Here universe is the name of the file containing the image without the extension, then universe.PNG becomes universe. The file name of the image should not contain white spaces nor multiple dots.

Note: The file extension is allowed to be included, but it's a good idea to omit it. If the file extension is omitted it will prompt LaTeX to search for all the supported formats. It is also usually recommended to use lowercase letters for the file extension when uploading image files. For more details see the section about generating high resolution and low resolution images.

Captions, labels and references

Images can be captioned, labelled and referenced by means of the **figure** environment as shown below:

```
\begin{figure}[h]
    \centering
    \includegraphics[width=0.25\textwidth]{mesh}
    \caption{a nice plot}
    \label{fig:mesh1}
\end{figure}

As you can see in the figure \ref{fig:mesh1}, the
function grows near 0. Also, in the page \pageref{fig:mesh1}
is the same example.
```
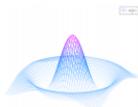
Figure 3: a nice plot

As you can see in the figure 3, the function grows near 0. Also, in the page 7 is the same example.

There are three important commands in the example:

- **\caption{a nice plot}**: As you may expect this command sets the caption for the figure. If you create a list of figures this caption will be used there. You can place it above or below the figure.

- **\label{fig:mesh1}**: If you need to refer the image within your document, set a label with this command. The label will number the image, and combined with the next command will allow you to reference it.

- **\ref{fig:mesh1}**: This code will be substituted by the number corresponding to the referenced figure.

When placing images in a LATEX document, we should always put them inside a **figure** environment or similar so that LATEX will position the image in a way that fits in with the rest of your text.

       Note: If you are using captions and references on your own computer, you will have to compile the document twice for the references to work.

WEEK-11

Various Formatting Styles In Latex

Creating lists in LATEX

Lists are very simple to create in LATEX. You can create lists using different list environments. Environments are sections of our document that you want to present in a different way to the rest of the document. They start with a **\begin{...}** command and end with an **\end{...}** command.

There are two main different types of lists, ordered lists and unordered lists. Each will use a different environment.

Unordered lists

Unordered lists are produced by the **itemize** environment. Each entry must be preceded by the control sequence **\item** as shown below.

```
\begin{itemize}
  \item The individual entries are indicated with a black dot, a so-called bullet.
  \item The text in the entries may be of any length.
\end{itemize}
```

- The individual entries are indicated with a black dot, a so-called bullet.
- The text in the entries may be of any length.

By default the individual entries are indicated with a black dot, so-called bullet. The text in the entries may be of any length.

Ordered lists

Ordered list have the same syntax inside a different environment. We make ordered lists using the **enumerate** environment:

```
\begin{enumerate}
  \item This is the first entry in our list
  \item The list numbers increase with each entry we add
\end{enumerate}
```

1. This is the first entry in our list
2. The list numbers increase with each entry we add

As with unordered lists, each entry must be preceded by the control sequence **\item**, which will automatically generate the number labelling the item. The enumerate labels consists of sequential numbers starting at one.

Adding math to LATEX

One of the main advantages of LATEX is the ease at which mathematical expressions can be written. LATEX allows two writing modes for mathematical expressions: the **inline** mode and the **display** mode. The first one is used to write formulas that are part of a text. The second one is used to write expressions that are not part of a text or paragraph, and are therefore put on separate lines. Let's see an example of the **inline** mode:

In physics, the mass-energy equivalence is stated
by the equation $E=mc^2$, discovered in 1905 by Albert Einstein.

In physics, the mass-energy equivalence is stated by the equation $E = mc^2$, discovered in 1905 by Albert Einstein.

To put your equations in inline mode use one of these delimiters: **\(... \), $ ... $** or **\begin{math} ... \end{math}**. They all work and the choice is a matter of taste.

The displayed mode has two versions: numbered and unnumbered.

The mass-energy equivalence is described by the famous equation

\[E=mc^2 \]

discovered in 1905 by Albert Einstein.
In natural units ($c = 1$), the formula expresses the identity

\begin{equation}
E=m
\end{equation}

The mass-energy equivalence is described by the famous equation

$$E = mc^2$$

discovered in 1905 by Albert Einstein. In natural units ($c = 1$), the formula expresses the identity

$$E = m \tag{1}$$

To print your equations in display mode use one of these delimiters: **\[... \], \begin{displaymath} ... \end{displaymath}** or **\begin{equation} ... \end{equation}**. $$ ... $$ is **discouraged** as it can give inconsistent spacing, and may not work well with some math packages.

Important Note: equation* environment is provided by an external package, consult the **amsmath** article.

Open an example in Overleaf

Many math mode commands require the **amsmath** package, so be sure to include it when writing math. An example is shown below of some basic math mode commands.

Subscripts in math mode are written as a_b and superscripts are written as a^b. These can be combined an nested to write expressions such as

\[T^{i_1 i_2 \dots i_p}_{j_1 j_2 \dots j_q} = T(x^{i_1},\dots,x^{i_p},e_{j_1},\dots,e_{j_q}) \]

We write integrals using $\int$ and fractions using $\frac{a}{b}$. Limits are placed on integrals using superscripts and subscripts:

\[\int_0^1 \frac{1}{e^x} = \frac{e-1}{e} \]

Lower case Greek letters are written as ω δ etc. while upper case Greek letters are written as Ω Δ.

Mathematical operators are prefixed with a backslash as $\sin(\beta)$, $\cos(\alpha)$, $\log(x)$ etc.

Subscripts in math mode are written as a_b and superscripts are written as a^b. These can be combined an nested to write expressions such as

$$T^{i_1 i_2 \ldots i_p}_{j_1 j_2 \ldots j_q} = T(x^{i_1}, \ldots, x^{i_p}, e_{j_1}, \ldots, e_{j_q})$$

We write integrals using $\int$ and fractions using $\frac{a}{b}$. Limits are placed on integrals using superscripts and subscripts:

$$\int_0^1 \frac{1}{e^x} = \frac{e-1}{e}$$

Lower case Greek letters are written as ω δ etc. while upper case Greek letters are written as Ω Δ.

Mathematical operators are prefixed with a backslash as $\sin(\beta)$, $\cos(\alpha)$, $\log(x)$ etc.

The possibilities with math in LATEX are endless and it is impossible to list them all here. Be sure to check out our other articles on

- Mathematical expressions
- Subscripts and superscripts
- Brackets and Parentheses
- Fractions and Binomials
- Aligning Equations
- Operators
- Spacing in math mode
- Integrals, sums and limits
- Display style in math mode
- List of Greek letters and math symbols
- Mathematical fonts

Basic Formatting

We will now look at how to write abstracts, as well as how to format a LATEX document into different chapters, sections and paragraphs.

Abstracts

In scientific documents it's a common practice to include a brief overview of the main subject of the paper. In LATEX there's the **abstract** environment for this. The **abstract** environment will put the text in a special format at the top of your document.

\begin{document}

\begin{abstract}
This is a simple paragraph at the beginning of the
document. A brief introduction about the main subject.

```
\end{abstract}
\end{document}
```

Abstract

This is a simple paragraph at the beginning of the document. A brief
introduction about the main subject.

Paragraphs and newlines

```
\begin{document}

\begin{abstract}
This is a simple paragraph at the beginning of the
document. A brief introduction about the main subject.
\end{abstract}

Now that we have written our abstract, we can begin writing our first paragraph.

This line will start a second Paragraph.
\end{document}
```

Abstract

This is a simple paragraph at the beginning of the document. A brief
introduction about the main subject.

Now that we have written our abstract, we can begin writing our first para-
graph.
This line will start a second Paragraph.

When writing the contents of your document, if you need to start a new paragraph you must hit the "Enter" key twice (to insert a double blank line). Notice that LATEX automatically indents paragraphs.

To start a new line without actually starting a new paragraph insert a break line point, this can be done by \\ (a double backslash as in the example) or the **\newline** command.

Care should be taken that multiple \\ or \newlines are not used to "simulate" paragraphs with larger spacing between them, as this can interfere with LATEX's typesetting algorithms. The recommended method to do so is to keep using double blank lines to create new paragraphs without any \\, and then add **\usepackage{parskip}** to the preamble.

You can find more information in the Paragraphs and new lines article.

Chapters and Sections

Commands to organize a document vary depending on the document type, the simplest form of organization is the sectioning, available in all formats.

```
\chapter{First Chapter}

\section{Introduction}

This is the first section.
```

Lorem ipsum dolor sit amet, consectetuer adipiscing
elit. Etiam lobortisfacilisis sem. Nullam nec mi et
neque pharetra sollicitudin. Praesent imperdietmi nec ante.
Donec ullamcorper, felis non sodales...

\section{Second Section}

Lorem ipsum dolor sit amet, consectetuer adipiscing elit.
Etiam lobortis facilisissem. Nullam nec mi et neque pharetra
sollicitudin. Praesent imperdiet mi necante...

\subsection{First Subsection}
Praesent imperdietmi nec ante. Donec ullamcorper, felis non sodales...

\section*{Unnumbered Section}
Lorem ipsum dolor sit amet, consectetuer adipiscing elit.
Etiam lobortis facilisissem

Chapter 1

First Chapter

1.1 Introduction

This is the first section.
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortisfacilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdietmi nec ante. Donec ullamcorper, felis non sodales...

1.2 Second Section

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisissem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi necante...

1.2.1 First Subsection

Praesent imperdietmi nec ante. Donec ullamcorper, felis non sodales...

Unnumbered Section

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisissem

The command **section{}** marks the beginning of a new section, inside the braces is set the title. Section numbering is automatic and can be disabled by including a * in the section command as *section{}**. We can also have **subsection{}**s, and indeed **subsubsection{}**s. The basic levels of depth are listed below:

-1	\part{part}
0	\chapter{chapter}

1	**\section{section}**
2	**\subsection{subsection}**
3	**\subsubsection{subsubsection}**
4	**\paragraph{paragraph}**
5	**\subparagraph{subparagraph}**

Note that **\part** and **chapter** are only available in report and book document classes.

For a more complete discussion about the document structure see the article about sections and chapters.

Creating tables

Creating a simple table in LATEX

Below you can see the simplest working example of a table

```
\begin{center}
\begin{tabular}{ c c c }
 cell1 & cell2 & cell3 \\
 cell4 & cell5 & cell6 \\
 cell7 & cell8 & cell9
\end{tabular}
\end{center}
```

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

The **tabular** environment is the default LATEX method to create tables. You must specify a parameter to this environment, in this case **{c c c}**. This tells LATEX that there will be three columns and that the text inside each one of them must be centred. You can also use **r** to align the text to the right and **l** for left alignment. The alignment symbol **&** is used to specify the breaks in the table entries. There must always be one less alignment symbol in each line than the number of columns. To go to the next line of your table, we use the new line command \\. We wrap the entire table inside the **center** environment so that it will appear in the center of the page.

Adding borders

The tabular environment is more flexible, you can put separator lines in between each column.

```
\begin{center}
\begin{tabular}{ |c|c|c| }
 \hline
 cell1 & cell2 & cell3 \\
 cell4 & cell5 & cell6 \\
 cell7 & cell8 & cell9 \\
 \hline
```

```
\end{tabular}
\end{center}
```

cell1	cell2	cell3
cell4	cell5	cell6
cell7	cell8	cell9

You can add borders using the horizontal line command **\hline** and the vertical line parameter |.

- **{ |c|c|c| }**: This declares that three columns, separated by a vertical line, are going to be used in the table. The | symbol specifies that these columns should be separated by a vertical line.

- **\hline**: This will insert a horizontal line. We have included horizontal lines at the top and bottom of the table here. There is no restriction on the number of times you can use **\hline**.

Below you can see a second example.

```
\begin{center}
\begin{tabular}{||c c c c||}
\hline
Col1 & Col2 & Col2 & Col3 \\ [0.5ex]
\hline\hline
1 & 6 & 87837 & 787 \\
\hline
2 & 7 & 78 & 5415 \\
\hline
3 & 545 & 778 & 7507 \\
\hline
4 & 545 & 18744 & 7560 \\
\hline
5 & 88 & 788 & 6344 \\ [1ex]
\hline
\end{tabular}
\end{center}
```

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Creating tables in LATEX can be a bit tricky sometimes, so you may want to use
the TablesGenerator.com online tool to export LATEX code for tabulars. The File > Paste table
data option lets you copy and paste data from spreadsheet applications.

Captions, labels and references

You can caption and reference tables in much the same way as images. The only difference is that
instead of the **figure** environment, you use the **table** environment.

Table \ref{table:data} is an example of referenced \LaTeX{} elements.

\begin{table}[h!]
\centering
\begin{tabular}{||c c c c||}
 \hline
 Col1 & Col2 & Col2 & Col3 \\ [0.5ex]
 \hline\hline
 1 & 6 & 87837 & 787 \\
 2 & 7 & 78 & 5415 \\
 3 & 545 & 778 & 7507 \\
 4 & 545 & 18744 & 7560 \\
 5 & 88 & 788 & 6344 \\ [1ex]
 \hline
\end{tabular}
\caption{Table to test captions and labels}
\label{table:data}
\end{table}

Table 1 is an example of referenced LATEX elements.

Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Table 1: Table to test captions and labels

Note: If you are using captions and references on your own computer, you will have to compile the
document twice for the references to work. Overleaf will do this for you automatically.'

Adding a Table of Contents

To create the table of contents is straightforward, the command **\tableofcontents** does all the work
for you:

\documentclass{article}
\usepackage[utf8]{inputenc}

\title{Sections and Chapters}
\author{Gubert Farnsworth}
\date{ }

```
\begin{document}

\maketitle

\tableofcontents

\section{Introduction}

This is the first section.

Lorem ipsum dolor sit amet, consectetuer adipiscing
elit.  Etiam lobortisfacilisis sem.  Nullam nec mi et
neque pharetra sollicitudin.  Praesent imperdietmi nec ante.
Donec ullamcorper, felis non sodales...

\addcontentsline{toc}{section}{Unnumbered Section}
\section*{Unnumbered Section}

Lorem ipsum dolor sit amet, consectetuer adipiscing elit.
Etiam lobortis facilisissem.  Nullam nec mi et neque pharetra
sollicitudin.  Praesent imperdiet mi necante...

\section{Second Section}

Lorem ipsum dolor sit amet, consectetuer adipiscing elit.
Etiam lobortis facilisissem.  Nullam nec mi et neque pharetra
sollicitudin.  Praesent imperdiet mi necante...

\end{document}
```

Sections and Chapters

Gubert Farnsworth

Contents

1   Introduction

This is the first section.
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis
facilisis sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet
mi nec ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices
augue, a dignissim nibh lectus placerat pede. Vivamus nunc nunc, molestie
ut, ultricies vel, semper in, velit. Ut porttitor. Praesent in sapien. Lorem
ipsum dolor sit amet, consectetuer adipiscing elit. Duis fringilla tristique neque.
Sed interdum libero ut metus. Pellentesque placerat. Nam rutrum augue a
leo. Morbi sed elit sit amet ante lobortis sollicitudin. Praesent blandit blandit
mauris. Praesent lectus tellus, aliquet aliquam, luctus a, egestas a, turpis.
Mauris lacinia lorem sit amet ipsum. Nunc quis urna dictum turpis accumsan
semper.

Unnumbered Section

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Etiam lobortis facilisis
sem. Nullam nec mi et neque pharetra sollicitudin. Praesent imperdiet mi nec
ante. Donec ullamcorper, felis non sodales commodo, lectus velit ultrices augue,

Sections, subsections and chapters are automatically included in the table of contents. To manually add entries, for example when you want an unnumbered section, use the command **\addcontentsline** .