INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	Probability and Statistics
Course Code	AHS010 (R16)
Class	II B. Tech III Semester
Branch	Civil Engineering
Year	2018 - 2019
Course Coordinator	Ms. B.praveena, Assistant Professor
Course Faculty	Ms. B.praveena, Assistant Professor Ms.P.srilatha, Assistant Professor

COURSE OBJECTIVES

The course should enable the students to:

I	Enrich the knowledge of probability on single random variables and probability distributions.
II	Apply the concept of correlation and regression to find covariance.
III	Analyze the given data for appropriate test of hypothesis.
IV	Enrich more than two population means using ANOVA

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COURSE LEARNING OUTCOMES

Students, who complete the course, will have demonstrated the asking to do the following:

CAHS010.01	Understand the basic concepts of probability and random variables.
CAHS010.02	Analyze the concepts of discrete and continuous random variables, probability distributions, expectation and variance.
CAHS010.03	Use the concept of random variables in real-world problem like graph theory, machine learning, Natural language processing.
CAHS010.04	Apply the binomial distribution and poisson distribution to find mean and variance.
CAHS010.05	Understand binomial distribution to the phenomena of real-world problem like sick versus healthy.
CAHS010.06	Use poission distribution in real-world problem to predict soccer scores.
CAHS010.07	Apply the inferential methods relating to the means of normal distributions.
CAHS010.08	Understand the mapping of normal distribution in real-world problem to analyze the stock market.
CAHS010.09	Explain multiple random variables and the covariance of two random variables.
CAHS010.10	Understand the concept of multiple random variables in real-world problems aspects of wireless communication system.
CAHS010.11	Calculate the correlation coefficient to the given data.

CAHS010.12	Understand the correlation and regression to the real-world such as stock price and interest rates.
CAHS010.13	Calculate the regression to the given data.
CAHS010.14	Understand the concept of sampling distribution of statistics and in particular describe the behavior of the sample mean.
CAHS010.15	Understand the concept of estimation for classical inference involving confidence interval.
CAHS010.16	Understand the concept of estimation in real-world problems of signal processing.
CAHS010.17	Understand the foundation for hypothesis testing.
CAHS010.18	Understand the concept of hypothesis testing in real-world problem to selecting the best means to stop smoking.
CAHS010.19	Apply testing of hypothesis to predict the significance difference in the sample means.
CAHS010.20	Apply testing of hypothesis to predict the significance difference in the sample proportions.
CAHS010.21	Apply Student t-test to predict the difference in sample means.
CAHS010.22	Apply F-test to predict the difference in sample variances.
CAHS010.23	Understand the characteristics between the samples using Chi-square test.
CAHS010.24	Understand the assumptions involved in the use of ANOVA technique.
CAHS010.25	Understand the concept ANOVA to the real-world problems to measure the atmospheric tides.
CAHS010.26	Understand the knowledge for attempting the competitive exams.

TUTORIAL QUESTION BANK

UNIT – I

SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTION

Part - A (Short Answer Questions)

S No	QUESTIONS	Blooms Taxonomy Level	Course Learning Outcomes (CLO)
1	If X is Poisson variate such that P(X=1) = 24P(X=3) then find the mean.	Understand	CAHS010.01
2	Find the probability distribution for sum of scores on dice if we throw two dice.	Understand	CAHS010.01
3	Out of 24 mangoes, 6 mangoes are rotten. If we draw two mangoes, Obtain probability distribution of number of rotten mangoes that can be drawn.	Understand	CAHS010.01
4	Determine the binomial distribution for which the mean is 4 and variance 3	Understand	CAHS010.04
5	If X is normally distributed with mean 2 and variance 0.1, then find $P(\lvert x-2\rvert \geq 0.01)$?	Understand	CAHS010.08
6	If X is a random variable then Prove E[X+K]= E[X]+K ,where 'K' constant.	Understand	CAHS010.02
7	Prove that $\sigma^2 = E(X^2) - \mu^2$.	Understand	CAHS010.02
8	Explain probability mass function and probability density of random variables.	Remember	CAHS010.02
9	If X is Discrete Random variable then Prove that Variance (a X +b) = a^2 Variance(X).	Understand	CAHS010.02
10	Explain about Poisson distribution.	Remember	CAHS010.04
11	A fair coin is tossed six times. Find the probability of getting four heads.	Remember	CAHS010.01
12	Define different types of random variables with example.	Remember	CAHS010.01
13	Assume that 50% of all engineering students are good in Mathematics. Determine the probability that among 18 engineering students exactly 10 are good in Mathematics.	Understand	CAHS010.04
14	Average number of accidents on any day on a national highway is 1.8. Determine the probability that the numbers of accidents are at least one.	Understand	CAHS010.04
15	Explain about Binomial distribution.	Remember	CAHS010.04
16	If a bank received on the average 6 bad cheques per day, find the probability that it will receive 4 bad cheques on any given day.	Understand	CAHS010.04
17	In eight throws of a die 5 or 6 is considered a success. Find the mean number of success.	Understand	CAHS010.04
18	A coin is tossed 9 times. Find the probability of getting 5 heads.	Understand	CAHS010.04
19	20% of items produced from a goods factory are defective. If we choose 5 items randomly then find the probability of non defective item.	Understand	CAHS010.04
20	The probability if no misprint in a book is e^{-4} then find probability that a page of book contains exactly two misprints.	Understand	CAHS010.04
	Part - B (Long Answer Questions)		
1	A random variable x has the following probability function: X: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 P(x): 0 | k | 2k | 2k | 3k | k^2 | $2k^2$ | $7k^2+k$ Find (i) k (ii) P(x<6) (iii) P($x \geq 6$)	Understand	CAHS010.02
2	Let X denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine	Understand	CAHS010.02

	(i) Discrete probability distribution (ii) Expectation (iii) Variance.		
3	A random variable X has the following probability function: X: -3, -2, -1, 0, 1, 2, 3 P(X): k, 0.1, k, 0.2, 2k, 0.4, 2k Then find (i) k (ii) mean (iii) variance.	Understand	CAHS010.02
4	A continuous random variable has the probability density function $f(x) = \begin{cases} kxe^{-\lambda x}, \ for\ x \geq 0, \lambda > 0 \\ 0, otherwise \end{cases}$ Determine (i) k (ii) Mean (iii) Variance.	Understand	CAHS010.02
5	If the probability density function of Random variable f(x) = $k\left(1-x^2\right), 0 < x < 1$ then find (i) k (ii) P[0.1<x<0.2] (iii) P[x>0.5].	Understand	CAHS010.07
6	If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs. How many students have masses (i) greater than 72 kg (ii) less than or equal to 64 kg (iii) between 65 and 71 kg inclusive.	Understand	CAHS010.07
7	Out of 800 families with 5 children each, how many would you expect to have (i)3 boys (ii)5girls (iii)either 2 or 3 boys ? Assume equal probabilities for boys and girls.	Understand	CAHS010.04
8	If a Poisson distribution is such that $P(X=1) = \frac{3}{2}P(X=3)$ then find (i) $P(X \geq 1)$ (ii) $P(X \leq 3)$ (iii) $P(2 \leq X \leq 5)$.	Understand	CAHS010.04
9	Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents is (i) at least one (ii) at most one.	Understand	CAHS010.04
10	In a Normal distribution, 7% of the item are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution.	Understand	CAHS010.07
11	A shipment of 20 tape recorders contains 5 defectives find the standard deviation of the probability distribution of the number of defectives in a sample of 10 randomly chosen for inspection.	Understand	CAHS010.04
12	If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that i) P(26 ≤ X≤40) ii) P(X ≥ 45).	Understand	CAHS010.07
13	4 coins are tossed 160 times. Fit the Binomial distribution of getting number of heads.	Understand	CAHS010.04
14	The mean weight of 500 male students at a certain college is 75kg and the standard deviation is 7kg assuming that the weights are normally distributed find how many students weigh I) Between 60 and 78 kg ii) more than 92kg.	Understand	CAHS010.04
15	The mean and standard deviation of the box obtained by 1000 students in an examination are respectively 34.5 and 16.5. Assuming the normality of the distribution. Find the approximate number of students expected to obtain marks between 30 and 60.	Understand	CAHS010.07
16	Out of 20 tape recorders 5 are defective. Find the standard deviation of defective in the sample of 10 randomly chosen tape recorders. Find (i) P(X=0) (ii) P(X=1) (iii) P(X=2) (iv) P (1<X<4).	Understand	CAHS010.04
17	A car-hire firm has two cars which it hires out day by day. The number of demands for a car o n each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days (i) no which there is no demand (ii) on which demand is refused.	Understand	CAHS010.04

18	The average number of phone calls per minute coming into a switch board between 2 P.M. and 4 P.M. is 2.5. Determine the probability that during one particular minute (i) 4 or fewer calls (ii) more than 6 calls.	Understand	CAHS010.04
19	In 1000 sets of trials per an event of small probability the frequencies f of the number of x of successes are F: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total X: 305 | 365 | 210 | 80 | 28 | 9 | 2 | 1 | 1000 Fit the expected frequencies.	Understand	CAHS010.04
20	For a normally distributed variate with mean 1 and standard deviation 3. Find i) $P(3.43 \le X \le 6.19)$ ii) $P(-1.43 \le X \le 6.19)$.	Understand	CAHS010.07
	Part - C (Problem Solving and Critical Thinking Questions)		
1	If $f(x)=k e^{-\lvert x \rvert}$ is probability density function in the interval, $-\infty < x < \infty$, then find i) k ii) Mean iii) Variance iv) $P(0<x<4)$.	Understand	CAHS010.02
2	The function $f(x)=Ax^2$, in $0< x <1$ is valid probability density function then find the value of A.	Understand	CAHS010.02
3	Prove that the Poisson distribution is a limiting case of Binomial distribution.	Remember	CAHS010.04
4	Derive variance of the Poisson distribution.	Remember	CAHS010.04
5	Prove that Mean = Mode in Normal distribution.	Remember	CAHS010.07
6	Derive median of the Normal distribution.	Remember	CAHS010.07
7	The marks obtained in Statistics in a certain examination found to be normally distributed. If 15% of the students greater than or equal to 60 marks, 40% less than 30 marks. Find the mean and standard deviation.	Understand	CAHS010.07
8	The variance and mean of a binomial variable X with parameters n and p are 4 and 3. Find i) $P(X=1)$ ii) $P(X \ge 1)$ iii) $P(0<X<3)$.	Understand	CAHS010.04
9	Fit a Binomial distribution to the following data X: 0 | 1 | 2 | 3 | 4 | 5 | 6 | Total F: 13 | 25 | 52 | 58 | 32 | 16 | 4 | 200	Understand	CAHS010.04
10	Two coins are tossed simultaneously. Let X denotes the number of heads then find i) E(X) ii) $E(X^2)$ iii)$E(X^3)$ iv) V(X).	Understand	CAHS010.02
	UNIT-II		
	MULTIPLE RANDOM VARIABLES		
	Part – A (Short Answer Questions)		
1	State the properties of joint distribution function of two random variables.	Remember	CAHS010.09
2	The equations of two regression lines are 7x-16y+9=0, 5y-4x-3=0. Find the coefficient of correlation.	Understand	CAHS010.13
3	Given n=10, $\sigma_x = 5.4, \sigma_y = 6.2$ and sum of product of deviations from the mean of X and Y is 66 find the correlation co-efficient.	Understand	CAHS010.11
4	From the following data calculate (i) correlation c coefficient (ii) standard deviation of y. bxy=0.85, byx=0.89, $\sigma_x = 3.$	Understand	CAHS010.11
5	If $r_{12} = 0.77, r_{13} = 0.72, r_{23} = 0.52$ Find the multiple correlation coefficient $R_{1.23.}$	Understand	CAHS010.11
6	Explain joint probability distribution.	Remember	CAHS010.09
7	Explain marginal probability density function.	Remember	CAHS010.09
8	Define joint probability mass, density function.	Understand	CAHS010.09
9	Explain types of correlation.	Remember	CAHS010.11
10	Write the properties of rank correlation coefficient.	Remember	CAHS010.11
11	Write the properties of regression lines.	Remember	CAHS010.13

12	Write the difference between correlation and regression.	Remember	CAHS010.13
13	If r_{12}=0.8, r_{13}=0.5 and r_{23}=0.3 then find multiple correlation coefficient $R_{1.23}$.	Understand	CAHS010.11
14	What is the marginal distributions of X and Y.	Understand	CAHS010.09
15	What are normal equations for regression lines?	Remember	CAHS010.13
16	Given n=12, $\sigma_x = 2.5, \sigma_y = 3.6$ and sum of the product of deviation from the mean of X and Y is 64 find the correlation co-efficient.	Understand	CAHS010.11
17	If r_{12}=0.5, r_{13}=0.3, r_{23}=0.45 then find multiple correlation coefficient $R_{1.23}$.	Remember	CAHS010.11
18	Define marginal probability mass function.	Understand	CAHS010.09
19	Define correlation coefficient.	Remember	CAHS010.11
20	Explain Joint probability density function.	Remember	CAHS010.09
	Part - B (Long Answer Questions)		
1	Consider the joint probability density function f(x, y) = xy, 0 < x < 1, 0 < y < 2. Find marginal probability density function of x and y.	Understand	CAHS010.09
2	Find joint probability density function of two random variables x and y where joint distribution function is $F(x,y) = \begin{cases} (1-e^{-x^2})(1-e^{-y^2}), & x>0, y>0 \\ 0, & Otherwise \end{cases}$ and also find $P(1 \le x \le 2, 1 \le y \le 2)$.	Understand	CAHS010.09
3	A random sample of 5 college students is selected and their gradesin mathematics ans statistics are found to be | | 1 | 2 | 3 | 4 | 5 | | Mathematics | 85 | 60 | 73 | 40 | 90 | | Statistics | 93 | 75 | 65 | 50 | 80 | Calculate Pearman's rank correlation coefficient.	Understand	CAHS010.11
4	Let X and Y random variables have the joint density function f(x, y)=2, 0<x<y<1then find marginal probability density function of x and y.	Understand	CAHS010.09
5	The joint probability density function $f(x,y) = \begin{cases} Ae^{-x-y}, 0<x<y, 0<y<\infty \\ 0. \ Otherwise \end{cases}$. Determine A.	Understand	CAHS010.09
6	Let x and y are two random variables with a joint probability density function $f(x,y) = \begin{cases} e^{-y}, & 0<x<y \\ 0. \ Otherwise \end{cases}$. Find the marginal probability density function of x and y.	Understand	CAHS010.09
7	Calculate the coefficient of correlation from the following data | x | 12 | 9 | 8 | 10 | 11 | 13 | 7 | | y | 14 | 8 | 6 | 9 | 11 | 12 | 13 |	Understand	CAHS010.11
8	For 20 army personal the regression of weight of kidneys (Y) on weight of heart (X) is Y=3.99X+6.394 and the regression of weight of heart on weight of kidneys is X=1.212Y+2.461. Find the correlation coefficient.	Understand	CAHS010.11
9	Two random variables x and y has a joint probability density function $f(x,y) = \begin{cases} \frac{5}{16}x^2y, & 0<y<x<2 \\ 0. \ Otherwise \end{cases}$. Find marginal probability density function .	Understand	CAHS010.09

<table>
<tr><td>10</td><td>Calculate the Karl Pearson’s coefficient of correlation from the following data.
<table>
<tr><td>Wages</td><td>100</td><td>101</td><td>102</td><td>102</td><td>100</td><td>99</td><td>97</td><td>98</td><td>96</td><td>95</td></tr>
<tr><td>Cost of living</td><td>98</td><td>99</td><td>99</td><td>97</td><td>95</td><td>92</td><td>95</td><td>94</td><td>90</td><td>91</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>11</td><td>Find a suitable coefficient of correlation for the following data:
<table>
<tr><td>Fertiliser used(tonnes)</td><td>15</td><td>18</td><td>20</td><td>24</td><td>30</td><td>35</td><td>40</td><td>50</td></tr>
<tr><td>Productivity (tonnes</td><td>85</td><td>93</td><td>95</td><td>105</td><td>120</td><td>130</td><td>150</td><td>160</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>12</td><td>The following tables gives the distribution of the total population and those who are totally partially blind among them. Find out if there is any relation between age and blindness.
<table>
<tr><td>Age</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td><td>60-70</td><td>70-80</td></tr>
<tr><td>No. of Persons (000)</td><td>100</td><td>60</td><td>40</td><td>36</td><td>24</td><td>11</td><td>6</td><td>3</td></tr>
<tr><td>Blind</td><td>55</td><td>40</td><td>40</td><td>40</td><td>36</td><td>22</td><td>18</td><td>15</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>13</td><td>Following are the ranks obtained by 10 students in two subjects, Statistics and Mathematics. To what extent the knowledge of the students in two subjects is related?
<table>
<tr><td>Statistics</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Mathematics</td><td>2</td><td>4</td><td>1</td><td>5</td><td>3</td><td>9</td><td>7</td><td>10</td><td>6</td><td>8</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>14</td><td>The ranks of 16 students in Mathematics and Statistics are as follows (1,1),(2,10),(3,3),(4,4),(5,5),(6,7),(7,2),(8,6),(9,8),(10,11),(11,15),(12,9),(13, 14),(14,12),(15,16),(16,13). Calculate the rank correlation coefficient for proficiencies of this group in mathematics and statistics.</td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>15</td><td>A sample of 12 fathers and their elder sons gave the following data about their elder sons. Calculate the coefficient of rank correlation.
<table>
<tr><td>Fathers</td><td>65</td><td>63</td><td>67</td><td>64</td><td>68</td><td>62</td><td>70</td><td>66</td><td>68</td><td>67</td><td>69</td><td>71</td></tr>
<tr><td>Sons</td><td>68</td><td>66</td><td>68</td><td>65</td><td>69</td><td>66</td><td>68</td><td>65</td><td>71</td><td>67</td><td>68</td><td>70</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>16</td><td>Determine the regression equation which best fit to the following data:
<table>
<tr><td>x</td><td>10</td><td>12</td><td>13</td><td>16</td><td>17</td><td>20</td><td>25</td></tr>
<tr><td>y</td><td>10</td><td>22</td><td>24</td><td>27</td><td>29</td><td>33</td><td>37</td></tr>
</table></td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>17</td><td>Find the most likely production corresponding to a rainfall 40 from the following data:
<table>
<tr><th></th><th>Rain fall(X)</th><th>Production(Y)</th></tr>
<tr><td>Average</td><td>30</td><td>500Kgs</td></tr>
<tr><td>Standard deviation</td><td>5</td><td>100Kgs</td></tr>
<tr><td>Coefficient of correlation</td><td>0.8</td><td>-</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>18</td><td>From a sample of 200 pairs of observation the following quantities were calculated.
$\Sigma X=11.34, \Sigma Y=20.78, \Sigma X^2=12.16, \Sigma Y^2=84.96, \Sigma XY=22.13$
From the above data show how to compute the coefficients of the equation $Y=a+bX$.</td><td>Understand</td><td>CAHS010.13</td></tr>
</table>

<table>
<tr><td>19</td><td>If $\sigma_x = \sigma_y = \sigma$ and the angle between the regression lines is $\text{Tan}^{-1}\left(\frac{4}{3}\right)$.
Find r.</td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>20</td><td>Give the following data compute multiple coefficient of correlation of X_3 on X_1 and X_2.
<table>
<tr><td>X_1</td><td>3</td><td>5</td><td>6</td><td>8</td><td>12</td><td>14</td></tr>
<tr><td>X_2</td><td>16</td><td>10</td><td>7</td><td>4</td><td>3</td><td>2</td></tr>
<tr><td>X_3</td><td>90</td><td>72</td><td>54</td><td>42</td><td>30</td><td>12</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td colspan="4">Part - C (Problem Solving and Critical Thinking Questions)</td></tr>
<tr><td>1</td><td>Prove that the angle between the two regression lines.</td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>2</td><td>If $\sigma_x = \sigma_y = \sigma$ and the angle between the regression lines are $\theta = Tan^{-1}(3)$. Obtain r.</td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>3</td><td>If θ is the angle between two regression lines and S.D. of Y is twice the S.D. of X and r=0.25, find tan θ.</td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>4</td><td>Determine b for joint probability density function
$f(x,y) = \begin{cases} be^{-(x+y)}, 0 < x < a, 0 < y < \infty \\ 0. \ Otherwise \end{cases}$.</td><td>Understand</td><td>CAHS010.09</td></tr>
<tr><td>5</td><td>Prove that the coefficient of correlation lies between -1 and 1.</td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>6</td><td>Find coefficient of correlation between X and Y for the following data.
<table>
<tr><td>X</td><td>10</td><td>12</td><td>18</td><td>24</td><td>23</td><td>27</td></tr>
<tr><td>Y</td><td>13</td><td>18</td><td>12</td><td>25</td><td>30</td><td>10</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>7</td><td>Ten competitors in a musical test were ranked by the three judges A,B and C in the following order.
<table>
<tr><td>Rank A</td><td>1</td><td>6</td><td>5</td><td>10</td><td>3</td><td>2</td><td>4</td><td>9</td><td>7</td><td>8</td></tr>
<tr><td>Rank B</td><td>3</td><td>5</td><td>8</td><td>4</td><td>7</td><td>10</td><td>2</td><td>1</td><td>6</td><td>9</td></tr>
<tr><td>Rank C</td><td>6</td><td>4</td><td>9</td><td>8</td><td>1</td><td>2</td><td>3</td><td>10</td><td>5</td><td>7</td></tr>
</table>
Using rank correlation method, discuss which pair of judges has the nearest approach to common likings in music.</td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>8</td><td>Obtain the rank correlation coefficient for the following data.
<table>
<tr><td>X</td><td>68</td><td>64</td><td>75</td><td>50</td><td>64</td><td>80</td><td>75</td><td>40</td><td>55</td><td>64</td></tr>
<tr><td>Y</td><td>62</td><td>58</td><td>68</td><td>45</td><td>81</td><td>60</td><td>68</td><td>48</td><td>50</td><td>70</td></tr>
</table></td><td>Understand</td><td>CAHS010.11</td></tr>
<tr><td>9</td><td>Find the multiple linear regression equation of X_1 on X_2 and X_3 from the data given below:
<table>
<tr><td>X_1</td><td>2</td><td>4</td><td>6</td><td>8</td></tr>
<tr><td>X_2</td><td>3</td><td>5</td><td>7</td><td>9</td></tr>
<tr><td>X_3</td><td>4</td><td>6</td><td>8</td><td>10</td></tr>
</table></td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td>10</td><td>Calculate the regression equation of Y on X from the data given below, taking deviations from actual means of X and Y.
<table>
<tr><td>Price(Rs.)</td><td>10</td><td>12</td><td>13</td><td>12</td><td>16</td><td>15</td></tr>
<tr><td>Amount Demanded</td><td>40</td><td>38</td><td>43</td><td>45</td><td>37</td><td>43</td></tr>
</table>
Estimate the likely demand when the price is Rs. 20.</td><td>Understand</td><td>CAHS010.13</td></tr>
<tr><td colspan="4">UNIT-III</td></tr>
<tr><td colspan="4">SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS</td></tr>
<tr><td colspan="4">Part - A (Short Answer Questions)</td></tr>
<tr><td>1</td><td>Explain different types and classification of sampling.</td><td>Remember</td><td>CAHS010.14</td></tr>
<tr><td>2</td><td>Define population? Give an example.</td><td>Remember</td><td>CAHS010.14</td></tr>
</table>

3	Define sample? Give an example.	Remember	CAHS010.14
4	Define parameter and statistic.	Remember	CAHS010.14
5	What is the value of correction factor if n=5 and N=200.	Understand	CAHS010.14
6	Define standard error of a statistic.	Remember	CAHS010.14
7	How many different samples of size n=2 can be chosen from a finite population of size 25.	Understand	CAHS010.14
8	Find standard error and probable error of sample size 14 and correlation coefficient 0.74.	Understand	CAHS010.14
9	If the population consists of four members 1, 5, 6, 8. How many samples of size three can be drawn with replacement?	Understand	CAHS010.14
10	The mean weekly wages of workers are with standard deviation of rupees 4. A sample of 625 is selected. Find the standard error of the mean.	Understand	CAHS010.14
11	Write about Point Estimation, Interval Estimation.	Remember	CAHS010.15
12	What is the maximum error one can expect to make with probability 0.9 when using mean of a random sample of size n=64 to estimate the means of a population with σ^2 =256.	Understand	CAHS010.15
13	Write a short note on Hypothesis, Null and Alternative with suitable examples.	Remember	CAHS010.17
14	Write a short Note on Type I & Type II error in sampling theory.	Remember	CAHS010.17
15	If n=40, $\sigma = 2.06$ then find the maximum error with 99% confidence.	Understand	CAHS010.15
16	Assuming that σ =20.0, how large a random sample be taken to assert with probability 0.95 that the sample mean will not differ from the true mean by more than 3.0 points?	Understand	CAHS010.15
17	A sample of size 64 is taken from a population whose variance is 2 with probability 0.99 find the maximum error.	Understand	CAHS010.15
18	What is the maximum error of large and small samples?	Remember	CAHS010.15
19	If we can assert with 95% that the maximum error is 0.5 and P=0.2 then find sample size.	Understand	CAHS010.15
20	In a sample of 500 people in Maharashtra 300 are wheat eaters. Find maximum error at 99% confidence level.	Understand	CAHS010.15
	Part - B (Long Answer Questions)		
1	A population consists of five numbers 2,3,6,8 and 11. Consider all possible samples of size two which can be drawn with replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CAHS010.14
2	A population consists of 5, 10, 14, 18, 13, 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CAHS010.14
3	A population consists of five numbers4, 8, 12, 16, 20, 24. Consider all possible samples of size two which can be drawn without replacement from this population. Find i) The mean of the population. ii) The standard deviation of the population.	Understand	CAHS010.14

	iii) The mean of the sampling distribution of means. iv) he standard deviation of the sampling distribution of means.		
4	Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6. Which can be drawn with replacement? Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) T he standard deviation of the sampling distribution of means.	Understand	CAHS010.14
5	Samples of size 2 are taken from the population 3, 6, 9, 15 27. Which can be drawn with replacement? Find i) The mean of the population ii) The standard deviation of the population iii) The mean of the sampling distribution of means iv) The standard deviation of the sampling distribution of means.	Understand	CAHS010.14
6	If the population is 3, 6, 9, 15, 27 i) List all possible samples of size 3 that can be taken without replacement from the finite population. ii) Calculate the mean of each of the sampling distribution of means. iii) Find the standard deviation of sampling distribution of means.	Understand	CAHS010.14
7	The mean height of students in a college is 155 cms and standard deviation is 15. What is the probability that the mean height of 36 students is less than 157 cms.	Understand	CAHS010.14
8	A random sample of size 100 is taken from an infinite population having the mean 76 and the variance 256. What is the probability that $\bar{x}$ will be between 75 and 78.	Understand	CAHS010.14
9	The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative.	Understand	CAHS010.14
10	A random sample of size 64 is taken from a normal population with μ =51.4 and σ =68. What is the probability that the mean of the sample will i) exceed 52.9 ii) fall between 50.5 and 52.3 iii) be less than 50.6.	Understand	CAHS010.14
11	Determine 99% confidence interval for the mean of contents of soft drink bottles if contents of 7 such soft drink bottles are 10.2, 10.4, 9.8, 10.0, 9.8, 10.2, 9.6 ml.	Understand	CAHS010.15
12	A sample of size 300 was taken whose variance is 225 and mean is 54. Construct 95% confidence interval for the mean.	Understand	CAHS010.15
13	Measurements of the weights of a random sample of 200 ball bearing made by a certain machine during one week showed a mean of 0.824 and a standard deviation of 0.042. Find maximum error at 95% confidence interval? Find the confidence limits for the mean if x=32.	Understand	CAHS010.15
14	Among 100fish caught in a large lake, 18 were inedible due to the pollution of the environment. With what confidence can we assert that the error of this estimate is at most 0.065?	Understand	CAHS010.15
15	A random sample of 400 items is found to have mean 82 and standard deviation of 18. Find the maximum error of estimation at 95% confidence interval. Find the confidence limits for the mean if $\bar{x}$ =82.	Understand	CAHS010.15
16	Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17,10,18,16, 9, 7, 11, 13 and 14.	Understand	CAHS010.15

17	To estimate the mean setting time of a new concrete mix, a record of the setting time for 15 spot repair are studied and the mean and standard deviation are found to be 39.3 minutes and 2.6 minutes respectively. Find a 90% confidence interval for the mean setting time.	Understand	CAHS010.15
18	The efficiency expert of a computer company tested 40 engineers to estimate the average time it takes to assemble a certain computer component, getting a mean of 12.73 minutes and standard deviation of 2.06 minutes. i) If $\bar{x} = 12.73$ is used as a point estimate of the actual average time required to perform the task, determine the maximum error with 99% confidence. ii) Construct 98% confidence intervals for the true average time it takes to do the job. iii) With what confidence can we assert that the sample men does not differ from the true mean by more than 30 seconds.	Understand	CAHS010.15
19	The mean of random sample is an unbiased estimate of the mean of the population 3, 6, 9, 15, 27. i) List of all possible samples of size 3 that can be taken without replacement from the finite population. ii) Calculate the mean of each of the samples listed in (i) and assigning each sample a probability of 1/10. Verify that the mean of these $\bar{x}$ is equal to 12. Which is equal to the mean of the population θ i.e. $E(\bar{x}) = \theta$.	Understand	CAHS010.15
20	Determine a 99% confidence interval for the mean of a normal distribution with variance is 4, using a sample of size is 200 values with mean $\bar{x}$ =10.	Understand	CAHS010.15
Part - C (Problem Solving and Critical Thinking Questions)			
1	Let S={1, 5, 6, 8}, find the probability distribution of the sample mean for random sample of size 2 drawn without replacement. Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CAHS010.14
2	Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6. Which can be drawn without replacement? Find i) The mean of the population. ii) The standard deviation of the population. iii) The mean of the sampling distribution of means. iv) The standard deviation of the sampling distribution of means.	Understand	CAHS010.14
3	A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.	Understand	CAHS010.14
4	A random sample of size 64 is taken from an infinite population having the mean 45 and the standard deviation 8. What is the probability that x will be between 46 and 47.5.	Understand	CAHS010.14
5	If a 1-gallon can of paint covers on an average 513 square feet with a standard deviation of 31.5 square feet, what is the probability that the mean area covered by a sample of 40 of these 1-gallon cans will be anywhere from 510to 520 square feet?	Understand	CAHS010.14
6	In a study of an automobile insurance a random sample of 80 body repair costs had a mean of Rs. 472.36 and the standard deviation of Rs. 62.35. If $\bar{x}$ is used as a point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed Rs. 10.	Understand	CAHS010.15

7	What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.	Understand	CAHS010.15
8	It is desired to estimate the mean number of hours of continuous use until a certain computer will first require repairs. If it can be assumed that standard deviation 48 hours, how large a sample be needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 hours.	Understand	CAHS010.15
9	The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can one assert with 95% confidence about the maximum error if sample mean is 11,795 and sample size is 50. And also construct 95% confidence interval for the true mean.	Understand	CAHS010.15
10	Determine a 95% confidence interval for the mean of normal distribution with variance 0.25, using a sample of size 100 values with mean 212.3.	Understand	CAHS010.15
UNIT-IV			
LARGE SAMPLE TESTS			
Part – A (Short Answer Questions)			
1	Distinguish between large and small samples with example.	Remember	CAHS010.19
2	In a manufacturing company out of 100 goods 25 are top quality. find sample proportion.	Remember	CAHS010.20
3	Construct the confidence interval for single mean if mean of sample size of 400 is 40, standard deviation is 10.	Understand	CAHS010.19
4	Construct the confidence interval for single proportion if 18 goods are defective from a sample of 200 goods.	Understand	CAHS010.20
5	Define sample proportion.	Remember	CAHS010.20
6	In a manufacturing company out of 200 goods 80 were faulty. find sample proportion .	Remember	CAHS010.20
7	Find the sample proportion in one day production of 400 articles only 50 are top quality.	Remember	CAHS010.20
8	Define large sample.	Remember	CAHS010.19
9	Write the test statistic for difference of means in large samples.	Remember	CAHS010.19
10	Write the test statistic for difference of proportions in large samples.	Remember	CAHS010.20
11	Find the confidence interval for mean if mean of sample size of 144 is 150, standard deviation is 2.	Understand	CAHS010.19
12	In a manufacturing company out of 120 goods 40 were faulty. find sample proportion .	Remember	CAHS010.20
13	Find the confidence interval for single proportion if 5 defective items among 4000 articles.	Understand	CAHS010.20
14	In a random sample of 125 coca cola drinkers 75 said they prefer thumsup to pepsi. Test the null hypothesis P=0.5 against alternative hypothesis P>0.5.	Remember	CAHS010.20
15	Write the procedure of test of hypothesis.	Remember	CAHS010.19
16	Define one tailed and two tailed test.	Remember	CAHS010.19
17	In a random sample of 225 coca cola drinkers 80 said they prefer pepsi to fanta. Test the null hypothesis P=0.5 against alternative hypothesis P>0.5.	Understand	CAHS010.20
18	Define critical region or region of rejection.	Remember	CAHS010.19
19	Define critical value or significant value.	Remember	CAHS010.19
20	How many types of errors in talking a decision about null hypothesis.	Remember	CAHS010.19
Part – B (Long Answer Questions)			
1	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40.Test whether the sample has come from a population with mean 38 also calculate 95% confidence interval for the	Understand	CAHS010.19

<table>
<tr><td></td><td>population.</td><td></td><td></td></tr>
<tr><td>2</td><td>The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>3</td><td>An ambulance service claims that it takes on the average 8.9 minutes to reach its destination In emergency calls. To check on this claim the agency which issues license to Ambulance service has then timed on fifty emergency calls getting a mean of 9.2 minutes with 1.6 minutes. What can they conclude at 5% level of significance?</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>4</td><td>Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality Test the hypothesis at 0.05 level.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>5</td><td>According to norms established for a mechanical aptitude test persons who are 18 years have an average weight of 73.2 with S.D 8.6 if 40 randomly selected persons have average 76.7 test the hypothesis $H_0 : \mu$ =73.2 against alternative hypothesis : μ >73.2.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>6</td><td>A sample of 100 electric bulbs produced by manufacturer 'A' showed a mean life time of 1190 hrs and s .d. of 90 hrs A sample of 75 bulbs produced by manufacturer 'B' Showed a mean life time of 1230 hrs with s.d. of 120 hrs. Is there difference between the mean life times of the two brands at a significance level of 0.05.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>7</td><td>In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with a standard deviation of 6.1 minutes .Can we reject the null hypothesis $\mu = 32.6$ minutes in favour of alternative null hypothesis $\mu > 32.6$ at $\alpha = 0.05$ level of significance.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>8</td><td>On the basis of their total scores, 200 candidates of a civil service examination are divided into two groups; the first group is 30% and the remaining 70%. Consider the first question of the examination among the first group, 40 had the correct answer. Whereas among the second group, 80 had the correct answer. On the basis of these results, can one conclude that the first question is not good at discriminating ability of the type being examined here.</td><td>Understand</td><td>CAHS010.20</td></tr>
<tr><td>9</td><td>A cigarette manufacturing firm claims that brand A line of cigarettes outsells its brand B by 8% .if it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B. Test whether 8% difference is a valid claim. .</td><td>Understand</td><td>CAHS010.20</td></tr>
<tr><td>10</td><td>If 48 out of 400 persons in rural area possessed 'cell' phones while 120 out of 500 in urban area. Can it be accepted that the proportion of 'cell' phones in the rural area and Urban area is same or not. Use 5% of level of significance.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>11</td><td>In an investigation on machine performance the following results are obtained.
<table>
<tr><th>M/C</th><th>No. of units inspected</th><th>No. of defectives</th></tr>
<tr><td>Machine I</td><td>375</td><td>17</td></tr>
<tr><td>Machine II</td><td>450</td><td>22</td></tr>
</table>
Test whether there is any significance performance of two machines at α = 0.05.</td><td>Understand</td><td>CAHS010.19</td></tr>
<tr><td>12</td><td>2. The nicotine in milligrams of two samples of tobacco were found to be as follows. Test the hypothesis for the difference between means at 0.05 level.</td><td>Understand</td><td>CAHS010.19</td></tr>
</table>

		Sample-A	24	27	26	23	25	-		
		Sample-B	29	30	30	31	24	36		
13	Samples of students were drawn from two universities and from their weights in kilograms mean and S.D are calculated and shown below make a large sample test to the significance of difference between means.		**Mean**	**Standard Deviation**	**Sample Size**				Understand	CAHS010.19
		University - A	55	10	400					
		University - B	57	15	100					
14	In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?								Understand	CAHS010.20
15	In a random sample 125 cool drinkers 68 said that they prefer thumsup to pepsi test the null hypothesis P=0.5 against the alternative hypothesis P>0.5 at 5%level of significane.								Understand	CAHS010.20
16	In a sample of 1000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance.								Understand	CAHS010.20
17	100 articles from a factory are examined and 10 are found to be defective. 500 similar articles from a second factory are found to be 15 defective. Test the significant difference between two proportions at 5% level.								Understand	CAHS010.20
18	Random sample of 400 men and 600 women were asked whether they would like to hava flyover near their residence .200 men and 325 women were in favour of proposal. Test the hypothesis that the proportion of men and women in favour of proposal are same at 5% level.								Understand	CAHS010.20
19	Two large populations are 30% and 25% respectively fair-haired people. Is the difference likely to be hidden in samples of 1200 and 900 respectively from the two populations.								Understand	CAHS010.20
20	A machine puts out of 16 imperfect articles in a sample of 500 articles after the machine is overhauled it puts out 3 imperfect articles in a sample of 100 articles. Has the machine improved?								Understand	CAHS010.20
	Part – C (Problem Solving and Critical Thinking)									
1	sample of 64 students have mean weight 70 kg can this be regarded as a sample from population with mean weight 56 kg and S.D 25 kg.								Understand	CAHS010.19
2	A sample of 900 members has mean of 3.4 and S.D of 2.61 is this sample has been taken from a large population mean 3.25 and S.D 2.61. Also calculate 95% confidence interval.								Understand	CAHS010.19
3	It is claimed that a random sample of 49 tyres has a mean life of 15200 kms this sample was taken from population whose mean is 15150 kms and S.D is 1200 km test 0.05 level of significant.								Understand	CAHS010.19
4	In 64 randomly selected hour production mean and S.D of production are 1.038 and 0.146 At 0.05 level of significant does this enable to reject the null hypothesis $\mu = 1$ against alternative hypothesis : $\mu > 1$.								Understand	CAHS010.19
5	A trucking company rm suspects the claim that average life of certain tyres is at least 28000 miles to check the claim rm puts 40 of this tyres on its truck and gets a mean life time of 27463 miles with a S.D 1348 miles can claim be true.								Understand	CAHS010.19
6	The mean height of 50 male students who participated in sports is 68.2 inches with a S.D of 2.5. The mean height of male students who have not participated in sports is 67.2 inches with a S.D of 2.8. Test the hypothesis								Understand	CAHS010.19

	that the height of the students who participated in sports more than the students who have not participated in sports.		
7	Studying the flow of traffic at two busy intersections between 4pm and 6pm to determine the possible need for turn signals. It was found that on 40 week days there were on the average 247.3 cars approaching the first intersection from the south which made left turn, while on 30 week days there were on the average 254.1 cars approaching the first intersection from the south made left turns . the corresponding samples S.DS are 15.2 and 12. Test the significant difference of two means at 5% level.	Understand	CAHS010.20
8	A manufacturer claims that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of sample of 200 pieces of equipments received 18 were faulty test the claim at 0.05 level.	Understand	CAHS010.20
9	Among the items produced by a factory out of 500, 15 were defective. In another sample of 400, 20 were defective test the significant difference between two proportions at 5% level.	Understand	CAHS010.20
10	A manufacturer produced 20 defective articles in a batch of 400. After overhauled it produced 10 defective in a batch of 300 has a machine being improved after over hauling.	Understand	CAHS010.20
UNIT-V			
SMALL SAMPLE TESTS AND ANOVA			
Part - A (Short Answer Questions)			
1	If $\bar{x}$ =47.5, $\mu = 42.1, s = 8.4, n = 24$ then find t.	Understand	CAHS010.21
2	Write a short note on Distinguish between t test for difference of means and F test.	Remember	CAHS010.22
3	If $\bar{x}$ =40, $\mu = 25, s = 8.4, n = 24$ then find t.	Remember	CAHS010.21
4	What is the test statistic for t test for single mean.	Remember	CAHS010.21
5	Define degree of freedom.	Remember	CAHS010.21
6	What is the degree of freedom for F test.	Remember	CAHS010.22
7	Find $F_{0.05}$ with (7,8) degrees of freedom.	Remember	CAHS010.22
8	Find $t_{0.05}$ when 16 degrees of freedom.	Remember	CAHS010.21
9	A random sample of size 16 from a normal population. The mean of sample is 53 and sum of square of deviations from mean is 150.can this sample is regarded as taken from the population having mean 56 at 0.05 level of significance.	Understand	CAHS010.21
10	Find $F_{0.95}$ with (19,24) degrees of freedom.	Remember	CAHS010.22
11	What is the test statistic for t test for difference of means.	Remember	CAHS010.21
12	Find $t_{0.99}$ when 7 degrees of freedom.	Remember	CAHS010.21
13	What is the degree of freedom for t test for difference of means.	Remember	CAHS010.21
14	Find $t_{0.95}$ when 9 degrees of freedom.	Remember	CAHS010.21
15	What is the test statistic for F test.	Remember	CAHS010.22
16	Find $F_{0.99}$ with (28,12) degrees of freedom.	Remember	CAHS010.22
17	Write the formulae for sample variance and sample standard deviation.	Remember	CAHS010.24
18	Define ANOVA.	Remember	CAHS010.24
19	What is the degree of freedom for chi square test in case of contingency table of order 4x3.	Remember	CAHS010.23
20	What is the test statistic for chi square test.	Remember	CAHS010.23
Part - B (Long Answer Questions)			
1	Producer of 'gutkha' claims that the nicotine content in his 'gutkha' on the average is 0.83 mg. can this claim be accepted if a random sample of 8 'gutkhas' of this type have the nicotine contents of 2.0,1.7,2.1, 1.9,2.2, 2.1, 2.0,1.6 mg.	Understand	CAHS010.21

<table>
<tr><td>2</td><td>A sample of 26 bulbs gives a mean life of 990 hrs with S.D of 20hrs. The manufacturer claims that the mean life of bulbs 1000 hrs. Is the sample not upto the standard?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>3</td><td>A random sample of 10 boys had the following I.Q's 70,120,110,101,88,83,95,98,107,100. Do the data support the assumption of population means I.Q of 100. Test at 5% level of significance?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>4</td><td>The means of two random samples of sizes 9,7 are 196.42 and 198.82.the sum of squares of deviations from their respective means are 26.94,18.73.can the samples be considered to have been the same population?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>5</td><td>In one sample of 8 observations the sum of squares of deviations of the sample values from the sample mean was 84.4 and another sample of 10 observations it was 102.6 .test whether there is any significant difference between two sample variances at at 5% level of significance.</td><td>Understand</td><td>CAHS010.22</td></tr>
<tr><td>6</td><td>Two random samples gave the following results.
<table>
<tr><th>Sample</th><th>size</th><th>Sample mean</th><th>Sum of squares of deviations from mean</th></tr>
<tr><td>I</td><td>10</td><td>15</td><td>90</td></tr>
<tr><td>II</td><td>12</td><td>14</td><td>108</td></tr>
</table>
Test whether the samples came from the same population or not?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>7</td><td>Two independent samples of items are given respectively had the following values.
<table>
<tr><td>Sample I</td><td>11</td><td>11</td><td>13</td><td>11</td><td>15</td><td>9</td><td>12</td><td>14</td></tr>
<tr><td>Sample II</td><td>9</td><td>11</td><td>10</td><td>13</td><td>9</td><td>8</td><td>10</td><td>-</td></tr>
</table>
Test whether there is any significant difference between their means?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>8</td><td>Time taken by workers in performing a job by method 1 and method 2 is given below.
<table>
<tr><td>Method 1</td><td>20</td><td>16</td><td>27</td><td>23</td><td>22</td><td>26</td><td>-</td></tr>
<tr><td>Method 2</td><td>27</td><td>33</td><td>42</td><td>35</td><td>32</td><td>34</td><td>38</td></tr>
</table>
Does the data show that variances of time distribution from population which these samples are drawn do not differ significantly?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>9</td><td>The no. of automobile accidents per week in a certain area as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accidents were same in the during last 10 weeks.</td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>10</td><td>A die is thrown 264 times with the following results .show that the die is unbiased.
<table>
<tr><td>No appeared on die</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Frequency</td><td>40</td><td>32</td><td>28</td><td>58</td><td>54</td><td>52</td></tr>
</table></td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>11</td><td>200 digits were choosen at random from set of tables the frequency of the digits are
<table>
<tr><td>digit</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td>frequency</td><td>18</td><td>19</td><td>23</td><td>21</td><td>16</td><td>25</td><td>22</td><td>20</td><td>21</td><td>15</td></tr>
</table>
Use chi square test to asset the correctness of the hypothesis that the digits are distributed in equal number in the table</td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>12</td><td>Fit a poisson distribution to the following data and test the goodness of fit at 0.05 level.
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>frequency</td><td>305</td><td>366</td><td>210</td><td>80</td><td>28</td><td>9</td><td>2</td><td>1</td></tr>
</table></td><td>Understand</td><td>CAHS010.23</td></tr>
</table>

<table>
<tr>
<td>13</td>
<td>Given below is the number of male births in 1000 families having 5 children
<table>
<tr><td>Male children</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Number of families</td><td>40</td><td>300</td><td>250</td><td>200</td><td>30</td><td>180</td></tr>
</table>
Test whether the given data is consistent with the hypothesis that the binomial distribution holds if the chance of a male birth is equal to female birth.</td>
<td>Understand</td>
<td>CAHS010.23</td>
</tr>
<tr>
<td>14</td>
<td>5 dice were thrown 96 times the number of times showing 4,5 or 6 obtain is given below
<table>
<tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>frequency</td><td>1</td><td>10</td><td>24</td><td>35</td><td>18</td><td>8</td></tr>
</table>
Fit a binomial distribution and test for goodness of fit.</td>
<td>Understand</td>
<td>CAHS010.23</td>
</tr>
<tr>
<td>15</td>
<td>The following is the distribution of the hourly number of trucks arriving at a company wear house.
<table>
<tr><td>Trucks per hour</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>frequency</td><td>52</td><td>151</td><td>130</td><td>102</td><td>45</td><td>12</td><td>3</td><td>1</td><td>2</td></tr>
</table>
Fit a poisson distribution to the following table and test the goodness of fit at 0.05 level.</td>
<td>Understand</td>
<td>CAHS010.23</td>
</tr>
<tr>
<td>16</td>
<td>The average breaking strength of the steel rods is specified to be 18.5 thousand pounds. To test this sample of 14 rods were tested. The mean and S.D obtained were 17.85 and 1.955 respectively. Is the result of experiment significant?</td>
<td>Understand</td>
<td>CAHS010.21</td>
</tr>
<tr>
<td>17</td>
<td>A group of 5 patients treated with medicine A weigh 42, 39, 48, 60 and 41 kgs . Second group of 7 patients from the same hospital treated with medicine B weigh 38, 42, 56, 64, 68, 69 and 62 kgs. Do you agree with the claim that medicine B increases the weigh significantly.</td>
<td>Understand</td>
<td>CAHS010.23</td>
</tr>
<tr>
<td>18</td>
<td>In one sample of 10 observations, the sum of the deviations of the sample values from sample mean was 120 and in the other sample of 12 observations it was 314. Test whether the difference is significant at 5% level.</td>
<td>Understand</td>
<td>CAHS010.22</td>
</tr>
<tr>
<td>19</td>
<td>The following table gives the classification of 100 workers according to gender and nature of work. Test whether the nature of work is independent of the gender of the worker.
<table>
<tr><th></th><th>Stable</th><th>Unstable</th><th>Total</th></tr>
<tr><td>Male</td><td>40</td><td>20</td><td>60</td></tr>
<tr><td>Female</td><td>10</td><td>30</td><td>40</td></tr>
<tr><td>Total</td><td>50</td><td>50</td><td>100</td></tr>
</table></td>
<td>Understand</td>
<td>CAHS010.23</td>
</tr>
<tr>
<td>20</td>
<td>Three different methods of teaching statistics are used on three groups of students. Random samples of size 5 are taken from each group and the results are shown below the grades are on a 10-point scale.
<table>
<tr><th>Group A</th><th>Group B</th><th>Group C</th></tr>
<tr><td>7</td><td>3</td><td>4</td></tr>
<tr><td>6</td><td>6</td><td>7</td></tr>
<tr><td>7</td><td>5</td><td>7</td></tr>
<tr><td>7</td><td>4</td><td>4</td></tr>
<tr><td>8</td><td>7</td><td>8</td></tr>
</table></td>
<td>Understand</td>
<td>CAHS010.24</td>
</tr>
</table>

<table>
<tr><td></td><td>Determine on the basis of the above data whether there is difference in the teaching methods.</td><td></td><td></td></tr>
<tr><td colspan="4">Part – C (Problem Solving and Critical Thinking)</td></tr>
<tr><td>1</td><td>A mechanist making engine parts with axle diameters of 0.700 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D of 0.040 inch. Compute the statistic you would use to test whether the work is meeting the specifications.</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>2</td><td>To examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measures the I.Q. The results are as follows.
<table>
<tr><td>Husbands</td><td>117</td><td>105</td><td>97</td><td>105</td><td>123</td><td>109</td><td>86</td><td>78</td><td>103</td><td>107</td></tr>
<tr><td>Wives</td><td>106</td><td>98</td><td>87</td><td>104</td><td>116</td><td>95</td><td>90</td><td>69</td><td>108</td><td>85</td></tr>
</table>
Test the hypothesis with a reasonable test at the level of significance of 0.05.</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>3</td><td>Two independent samples of 8 & 7 items respectively had the following values.
<table>
<tr><td>Sample I</td><td>11</td><td>11</td><td>13</td><td>11</td><td>15</td><td>9</td><td>12</td><td>14</td></tr>
<tr><td>Sample II</td><td>9</td><td>11</td><td>10</td><td>13</td><td>9</td><td>8</td><td>10</td><td></td></tr>
</table>
Is the difference between the means of samples significant?</td><td>Understand</td><td>CAHS010.21</td></tr>
<tr><td>4</td><td>Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins. the sample standard deviation of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal.</td><td>Understand</td><td>CAHS010.22</td></tr>
<tr><td>5</td><td>From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.
<table>
<tr><th>Soft drinks</th><th>Clerks</th><th>Teachers</th><th>officers</th></tr>
<tr><td>Pepsi</td><td>10</td><td>25</td><td>65</td></tr>
<tr><td>Thumsup</td><td>15</td><td>30</td><td>65</td></tr>
<tr><td>Fanta</td><td>50</td><td>60</td><td>30</td></tr>
</table></td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>6</td><td>In an investigation on the machine performance, the following results are obtained.
<table>
<tr><th></th><th>No.of units inspected</th><th>No.of defective</th></tr>
<tr><td>Machine1</td><td>375</td><td>17</td></tr>
<tr><td>Machine2</td><td>450</td><td>22</td></tr>
</table></td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>7</td><td>A survey of 240 families with 4 children each revealed the following distribution.
<table>
<tr><td>Male Births</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td>No of families</td><td>10</td><td>55</td><td>105</td><td>58</td><td>12</td></tr>
</table>
Test whether the male and female births are equally popular.</td><td>Understand</td><td>CAHS010.23</td></tr>
<tr><td>8</td><td>Samples of students were drawn from two universities and from their weights in kilograms mean and S.D are calculated and shown below make a large sample test to the significance of difference between means.
<table>
<tr><th></th><th>Mean</th><th>Standard Deviation</th><th>Sample Size</th></tr>
<tr><td>University A</td><td>55</td><td>10</td><td>400</td></tr>
<tr><td>University B</td><td>57</td><td>15</td><td>100</td></tr>
</table></td><td>Understand</td><td>CAHS010.23</td></tr>
</table>

<table>
<tr>
<td>9</td>
<td>Marks obtained by students
<table>
<tr><th>Group A</th><th>Group B</th><th>Group C</th></tr>
<tr><td>16</td><td>15</td><td>15</td></tr>
<tr><td>17</td><td>15</td><td>14</td></tr>
<tr><td>13</td><td>13</td><td>13</td></tr>
<tr><td>18</td><td>17</td><td>14</td></tr>
</table>
Using ANOVA find out whether teaching methods had any effect on the students performance</td>
<td>Understand</td>
<td>CAHS010.24</td>
</tr>
<tr>
<td>10</td>
<td>Three training methods were compared to see if they led to greater productivity after training. The productivity measures for individuals trained by different methods are as follows.
<table>
<tr><td>Method 1</td><td>36</td><td>26</td><td>31</td><td>20</td><td>34</td><td>25</td></tr>
<tr><td>Method 2</td><td>40</td><td>29</td><td>38</td><td>32</td><td>39</td><td>34</td></tr>
<tr><td>Method 3</td><td>32</td><td>18</td><td>100</td><td>21</td><td>33</td><td>27</td></tr>
</table>
At the 0.05 level of significance, do the three training methods lead to difference levels of productivity?</td>
<td>Understand</td>
<td>CAHS010.24</td>
</tr>
</table>

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