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Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring 2023
Course Code: STA 221, Course Title: Statistics and Probability
Level: 2 Term: 2 Batch: 60

Time: 01.5 Hrs **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	*a)*	The course teacher asked randomly10 of his students about the best measures of central tendency after delivered his lecture. Among them 70% students provide correct answer. Select variable, population, sample and statistic from the above statement.	[2]	CO1
	b)	Find the difference between qualitative and quantitative variables? Name out different graphs and charts for both variables.	[2]	
	c)	Choose the best measures of dispersion and give an explanation.	[1]	
2.	*a)*	The last investment of randomly selected different software farms was surveyed as following 25,12,13,39,23,27,86,50,65,67,89,90,145,120,23,27,34,290,36,40		CO2
		i) Construct Box-plot from the above data.	[4]	
		ii) Select the outlier if have any.	[2]	
	b)	Develop the shape of the distribution (Skewness) from the above data 2 (a)	[4]	
3.	*a)*	The mean life time of a sample of 50 light tubes produced by a company is found to be 1100 hours and the population standard deviation is 70 hours. Test the hypothesis at the 5% level of significance that the mean of the tubes produced by the company is 1050 hours. [Tabulated Value=1.96]	[5]	CO3
	b)	In a particular department 21, 24, 32, 39, 27, 13, 35, 22, 23 are the number of students in different sections are expert at C++ and 13, 11, 39, 21, 24, 16, 25 are the expert at python. Compare the two programing language according to consistency of the students.	[5]	

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Formula

Measures of Central Tendency

Mean

A.M= $\bar{x}=\frac{x_1+x_2+\cdots+x_n}{n}$

W.M= $\bar{x}=\frac{w_1x_1+w_2x_2+\cdots+w_nx_n}{w_1+w_2+\cdots+w_n}$

G.M=$\bar{x}=((x_1.x_2.x_3\ldots x_n))^{1/n}$

H.M=$\frac{n}{\frac{1}{x1}+\frac{1}{x2}+\cdots+\frac{1}{xn}}$

Median

If "n" is odd, $M_e=X_{1/2(n+1)}$

If "n" is even, $M_e=\frac{1}{2}\left(X_{n/2}+X_{\frac{n}{2}+1}\right)$

Measures of Location

Quartile, $Q_l=\frac{l(n+1)}{4}$

Decile, $Dl=D_l=\frac{l(n+1)}{10}$

Percentile, $Pl=\frac{l(n+1)}{100}$

You can also use

Quartile

$Q_l=\frac{l\times n}{4}$

Deciles

$D_l=\frac{l\times n}{10}$

Percentile

$P_l=\frac{l\times n}{100}$

Measure of Dispersion

Range= X_{max} - X_{min}

Mean Deviation, M.D $=\frac{\sum_{i=1}^{n}|x_i-\bar{x}|}{n}$

Population variance

$\sigma^2=\frac{\sum_{i=1}^{N}(X_i-\mu)^2}{N}$

Population standard deviation, $\sqrt{\sigma^2}$

Sample variance

$s^2=\frac{\sum_{i=1}^{N}(X_i-\bar{X})^2}{n-1}$

Population standard deviation, $\sqrt{s^2}$

Coefficient of variation for population, C.V= $\frac{\sigma}{\mu}\times 100$

Coefficient of variation for sample, C.V= $\frac{s}{\bar{x}}\times 100$

Hypothesis testing

Z test statistics

$Z=\frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}}$

t test statistics

$t=\frac{\bar{X}-\mu}{s/\sqrt{n}}$

Shape of the distribution

Coefficient of Sknewness, Sk= $\frac{3\times(Mean-Median)}{Standard\ deviation}$

Kurtosis $\beta_2=\frac{\mu_4}{\mu_2^2}$