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Daffodil International University

Department of Computer Science and Engineering
Faculty of Science and Information Technology
Mid-term Examination, Spring 2024
Course Code: STA227, Course Title: Statistics and Probability

Time: 01:30 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)*	Suppose, an economist wanted to know the average income of the people of Bangladesh. So, he divided the whole population into 495 sub-districts and 50 sub-districts were selected randomly. Then income of every household of that 50 sub-districts were recorded. **Find** population, sample, variable, type of variable, level of measurement and employed sampling technique from the above scenario.	[3]	CO1
	b)	**Choose** the appropriate measures of central tendency for nominal and ordinal data? **Define** which measure is applicable at all levels of measurements?	[2]	
2.	*a)*	The quiz marks of 10 students are 13, 9, 12, 10, 14, x, 15, 11, 14, 9 **Identify** the value of x when the average is 11.5 for the 10 students.	[2]	CO2
	b)	Suppose, following data represents the amount of time (in minutes per day) spending on social media of 15 students in a shelf: 250, 320, 280, 310, 400, 290, 300, 330, 180, 290, 480, 285, 275, 260, 295.		
		i) **Construct** an appropriate graph using the above data.	[3]	
		ii) **Identify** if there is any "Outlier" in the above dataset. Also represent with a modified box-Plot.	[4]	
		iii) **Identify** the best measure of central tendency in this case with appropriate explanation.	[1]	
3.	*a)*	The weekly sales of phone of two brands Samsung and Oneplus are recorded as below:		CO3

OnePlus	59	75	95	100	56	85
Samsung	80	90	150	125	82	95

	Compare brand seems to be more consistent in respect to sales. **Solve** using relative measure of dispersion.	[5]
b)	In a survey of 10 CSE students, we gathered data on their weekly coding practice (in hour). The recorded times are as follows: 3.0, 2.9, 3.7, 4.0, 3.1, 3.6, 4.3, 3.4, 2.2, 2.1, **Analyze** the shape of the distribution by using the formula of skewness and comment on the shape.	[5]

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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

$Q_i=\frac{i\times n}{4}$

Deciles

$D_i=\frac{i\times n}{10}$

Percentile

$P_i=\frac{i\times n}{100}$

Inner fence

Q_1-1.5×IQR, Q_3 +1.5×IQR

Outer fence

Q_1- 3×IQR, Q_3 + 3×IQR

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

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

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

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

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

Shape of the distribution

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

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