

Princess Sumaya University of Technology  
Statistical Methods for IT / Midterm Exam  
Spring 2022

Student's Name:

Saturday 16/4/2022

ID:

Dr.Raja'a AL-Qderat

**Q#1:** Write down the correct answers only in the table below:

(12 marks)

Question Number	1	2	3	4	5	6	7	8
Answer	B	A	B	B	C	A	A	A

1) The variable "The number of siblings" is:

- A) Numerical, Continuous, Interval    B) Numerical, Discrete, Ratio  
C) Numerical, Continuous, Ratio    D) Numerical, Discrete, Interval

2) A bell-shaped population data has a mean of 23 and a standard deviation of 9. Approximately 99.7% of the data lie inside the interval:

- A) [-4,50]    B) [-14,32]    C) [5,41]    D) [6,30]

3) Two events A and B are independent if

- A)  $P(B/A) = P(A)$     B)  $P(B/A) = P(B)$   
C)  $P(A \cup B) = P(A) + P(B)$     D) Can't tell

Answer the questions 4-8 regarding the data below:

2,2,6,9,12,12,14,15,15,23,28,30,32

4) The value of  $Q_1$  is:

- A) 6    B) 9    C) 7.5    D) 10

5) The value of  $Q_2$  is:

- A) 12    B) 13    C) 14    D) 15

6) The value of  $Q_3$  is:

- A) 23    B) 15    C) 19    D) 25.5

7) The distribution is:

- A) Right-skewed    B) Left-Skewed    C) Symmetric

8) The value 28 represents the percentile:

- A) 80.77    B) 70    C) 87.5    D) 73

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Q#1: Write down the correct answers only in the table below:

(12 marks)

Question Number	1	2	3	4	5	6	7	8
Answer	C	C	A	C	B	C	A	C

1) The variable "The area of an apartment" is:

- A) Numerical, Continuous, Interval    B) Numerical, Discrete, Ratio  
C) Numerical, Continuous, Ratio    D) Numerical, Discrete, Interval

2) A bell-shaped population data has a mean of 23 and a standard deviation of 9. Approximately 95% of the data lie inside the interval:

- A) [-4,50]    B) [-14,32]    C) [5,41]    D) [6,30]

3) Two events A and B are independent if

- A)  $P(A/B) = P(A)$     B)  $P(A/B) = P(B)$   
C)  $P(A \cup B) = P(A) + P(B)$     D) Can't tell

Answer the questions 4-8 regarding the data below:

2,2,6,9,12,12,14,15,15,23,28,30

4) The value of  $Q_1$  is:

- A) 6    B) 9    C) 7.5    D) 10

5) The value of  $Q_2$  is:

- A) 12    B) 13    C) 14    D) 15

6) The value of  $Q_3$  is:

- A) 23    B) 15    C) 19    D) 25.5

7) The distribution is:

- A) Right-skewed    B) Left-Skewed    C) Symmetric

8) The value 28 represents the percentile:

- A) 83.33    B) 70    C) 87.5    D) 73

**Q#2:** Suppose A and B are events such that  $P(A) = 0.6$ ,  $P(B) = 0.5$  and  $P(A/\bar{B}) = 0.3$ . Find the value of the following: (4 marks)

1)  $P(\bar{A} \cup \bar{B})$

$$P(A/\bar{B}) = \frac{P(A \cap \bar{B})}{P(\bar{B})} \Rightarrow 0.3 = \frac{P(A) - P(A \cap B)}{1 - P(B)} \quad (1)$$

$$\Rightarrow \frac{0.6 - P(A \cap B)}{0.5} = 0.3 \Rightarrow P(A \cap B) = 0.6 - 0.15 = 0.45 \quad (1)$$

2)  $P(\bar{A}/\bar{B})$

$$P(\bar{A} \cup \bar{B}) = 1 - P(A \cap B) = 1 - 0.45 = 0.55$$

$$P(\bar{A}/\bar{B}) = \frac{P(\bar{A} \cap \bar{B})}{P(\bar{B})} = \frac{P(\bar{A} \cup \bar{B})}{P(\bar{B})} = \frac{0.55}{0.5} = 1.1 \quad (1)$$

**Q#3:** In a research project on the relation between the gender of 150 science students at college and their degree subject the following data set is collected: (6 marks)

Subject \ Gender	Biology	Physics	Chemistry
Male	40	16	35
Female	15	24	20

One student is selected at random. Find the probability that the student is:

**(Final Answers only will not be graded)**

1) Male or studies biology.

$$P(M \cup B) = P(M) + P(B) - P(M \cap B)$$

$$= \frac{91}{150} + \frac{55}{150} - \frac{40}{150} = \frac{106}{150} = 0.7066 \quad (1)$$

2) Female given that she studies physics.

$$P(F/P) = \frac{24}{40} = 0.6 \quad (2)$$

3) Male and doesn't study chemistry.

$$P(M \cap \bar{C}) = P(M - C)$$

$$= P(M) - P(M \cap C)$$

$$= \frac{91}{150} - \frac{35}{150} = \frac{56}{150} = 0.3733 \quad (1)$$

Q#4: The frequency distribution represents the cost (in cents) for the utilities of states that supply much of their own power is shown below:

Class limits	Frequency	$X_m$	$f_i \cdot X_m$	$X_m^2$	$f_i \cdot X_m^2$
6-8	12	7	284	49	588
9-11	16	10	160	100	1600
12-14	3	13	39	169	507
15-17	1	16	16	256	256
18-20	0	19	0	361	0
21-23	0	22	0	484	0
24-26	1	25	25	625	625
			324		3576

Find the following:

1) The mean.

(2 marks)

2) The variance.

(3 marks)

3)  $P_{30}$ .

(3 marks)

$$1) \bar{X} = \frac{324}{33} = 9.8$$

$$2) S^2 = \frac{33(3576) - (324)^2}{33(32)} = 12.34$$

3)

upper bandaries	Cumulative frequency
8.5	12
11.5	28
14.5	31
17.5	32
20.5	32
23.5	32
26.5	33

$$\text{rank} = \frac{33(30)}{100}$$

$$\text{rank} = 9.9$$

$$\frac{y - 5.5}{8.5 - 5.5} = \frac{9.9 - 0}{12 - 0}$$

$$\Rightarrow y = 7.975$$