

# Statistics MCQ Question Bank

Second Paper

**Abdullah Al Mahmud**

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# 1 Introduction to Probability

## 1.1 Permutation-Combination

1. Three objects can be placed in 2 positions in – ways.

- (a) 3 (b) 4 (c) 6 (d) 8

2. In how many ways can a team of 2 be formed from 4 people?

- (a) 4 (b) 6 (c) 8 (d) 12

3.  ${}^n p_r =$

- (a)  $\frac{n!}{(n-r)!}$  (b)  $\frac{n!}{(n+r)!}$  (c)  $\frac{n!}{r!}$  (d)  $\frac{n!}{(r-n)!}$

4.  ${}^n C_r =$

- (a)  $\frac{n!}{(n-1)!(n+r)!}$  (b)  $\frac{r!}{n!(n-r)!}$  (c)  $\frac{n!(n-1)!}{r!}$  (d)  $\frac{n!}{(r-n)!}$

## 1.2 Conceptual Questions

5. What is the probability that at least one item in a sample space will occur?

- (a) 0 (b) 0.5 (c) 1 (d) Undefined

6. The probability of two disjoint sets happening together is:

- (a) 0.5 (b) 0 (c) 1 (d)  $0 \leq x < 1$

7. How many additive laws of probability are there?

- (a) 1 (b) 2 (c) 3 (d) 4

8.  $P(A \cup B) = P(A) + P(B)$  implies A & B are –

- (a) Disjoint (b) Independent (c) Joint (d) Independent

9. Which is the formula of classical approach of probability?

- (a)  $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$  (b)  $P = \frac{\text{No. of total outcomes}}{\text{No. of favorable outcomes}}$   
(c)  $P = \lim_{n(S) \rightarrow \infty} \frac{n(A)}{n(S)}$  (d)  $P = \lim_{n(A) \rightarrow \infty} \frac{n(A)}{n(S)}$

10. Which is the formula of empirical/relative frequency approach of probability?

- (a)  $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$  (b)  $P = \frac{\text{No. of total outcomes}}{\text{No. of favorable outcomes}}$   
(c)  $P = \lim_{n(S) \rightarrow \infty} \frac{n(A)}{n(S)}$  (d)  $P = \lim_{n(A) \rightarrow \infty} \frac{n(A)}{n(S)}$

11. What is the correct formula for conditional probability?

- (a)  $P(A|B) = \frac{P(A \cap B)}{P(B|A)}$  (b)  $P(A|B) = \frac{P(A \cap B)}{P(A)}$  (c)  $P(A|B) = \frac{P(A \cap B)}{P(B)}$  (d)  $P(A|B) = \frac{P(B|A)}{P(B|A)}$

12. The third axiom of probability is –

- (a)  $0 \leq P(A) \leq 1$  (b)  $P(S) = 1$   
(c)  $P(A_1 \cup A_2 \cup \dots \cup A_n) = \sum_{i=1}^{\infty} P(A_i)$  (d)  $P(A) = 1 - P(A)$

13. Possible value of probability  
i. -1    ii. 0.5    iii. 0  
Which one is correct?  
(a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii
14. An act repeated under some specific conditions is called –  
(a) Event                      (b) Experiment                      (c) Sample                      (d) Sample space
15.  $P(0)$  implies –  
(a) A certain event                      (b) An uncertain event                      (c) An impossible event                      (d) A probable event
16. Events having some common elements are called –  
(a) Complementary events                      (b) Mutually exclusive events  
(c) Exhaustive events                      (d) Non-Mutually exclusive events events
17. The minimum value of probability is  
(a)  $-\alpha$                       (b) 1                      (c) 0                      (d) -1
18. Each element of sample space is called–  
(a) Trial                      (b) Experiment                      (c) Variable                      (d) Sample Point
19. Two events not occurring together are called–  
(a) dependent Events                      (b) Independent Events  
(c) Mutually Exclusive Events                      (d) Marginal Events
20. If A and B are independent, which formula is correct?  
(a)  $P(A \cap B) = P(A) \cdot P(B)$                       (b)  $P(A \cap B) = P(\bar{A}) \cdot P(B)$   
(c)  $P(A \cap B) = P(A) \cdot P(\bar{B})$                       (d)  $P(A \cap \bar{B}) = P(A) \cdot P(B)$
21. 10 out of each 100 people in a city walk to the office. If one is picked randomly, what is the probability s/he does not walk to the office?  
(a) 0.95                      (b) 0.10                      (c) 0.90                      (d) 0.01
22. In a school, 15 out of 100 students prefer online classes over in-person classes. If a student is selected randomly, what is the probability that they prefer in-person classes?  
(a) 0.15                      (b) 0.85                      (c) 0.75                      (d) 0.25
23. A factory reports that 8 out of every 100 manufactured items are defective. If an item is chosen at random, what is the probability that it is not defective?  
(a) 0.08                      (b) 0.92                      (c) 0.80                      (d) 0.12
24. A hospital study finds that 12% of patients do not prefer evening appointments. If a patient is selected at random, what is the probability that they prefer evening appointments?  
(a) 0.12                      (b) 0.78                      (c) 0.88                      (d) 0.18
25. A survey shows that 5 out of every 200 customers in a store pay with cash. If a customer is picked randomly, what is the probability that they pay using another method?  
(a) 0.050                      (b) 0.500                      (c) 0.975                      (d) 0.025

### 1.3 Coin-Die

26. Tossing a die  $r$  times generates how many outcomes?  
(a)  $6 \times r$  (b)  $r^6$  (c)  $6^r$  (d)  $2^r$
27. Tossing a coin  $r$  times generates how many outcomes?  
(a)  $2 \times r$  (b)  $r^2$  (c)  $2^r$  (d)  $6^r$
28. A coin is thrown thrice. How many outcomes are generated?  
(a) 3 (b) 4 (c) 8 (d) 9
29. A coin is thrown twice. What is the probability of getting 2 heads?  
(a)  $\frac{1}{4}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{2}$  (d)  $\frac{2}{4}$
30. A fair coin is tossed twice. What is the probability of getting at least one tail?  
(a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$  (c)  $\frac{3}{4}$  (d)  $\frac{1}{3}$
31. Two fair coins are tossed simultaneously. What is the probability of getting exactly one head?  
(a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$  (c)  $\frac{3}{4}$  (d)  $\frac{1}{3}$
32. A coin is flipped twice. What is the probability of getting heads first and tails second?  
(a)  $\frac{1}{4}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{2}$  (d)  $\frac{2}{4}$
33. If two fair coins are tossed together, what is the probability of getting at least one head?  
(a)  $\frac{1}{2}$  (b)  $\frac{1}{3}$  (c)  $\frac{3}{4}$  (d)  $\frac{1}{4}$
34. A fair coin is tossed twice. What is the probability of getting two tails?  
(a)  $\frac{1}{2}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{4}$  (d)  $\frac{2}{4}$
35. Two fair coins are tossed. What is the probability that at least one of them lands on tails?  
(a)  $\frac{3}{4}$  (b)  $\frac{1}{2}$  (c)  $\frac{1}{4}$  (d)  $\frac{1}{3}$
36. A die is thrown twice. This is called –  
(a) An experiment (b) sample space (c) A random experiment (d) A trial
37. If a neutral die is thrown, the probability of having a digit greater than 6 is  
(a)  $\frac{1}{6}$  (b)  $\frac{0}{6}$  (c)  $\frac{2}{3}$  (d)  $\frac{3}{6}$
38. Tossing a coin twice generates how many outcomes?  
(a) 4 (b) 16 (c) 8 (d) 2
39. A die is rolled twice. How many possible outcomes are there?  
(a) 6 (b) 12 (c) 36 (d) 18

## 1.4 Balls-Cards

40. There are 3 red, 4 black, and 5 white balls in an urn. If two balls are randomly taken, what is the probability that both are red?  
(a)  $\frac{1}{66}$  (b)  $\frac{1}{22}$  (c)  $\frac{2}{22}$  (d)  $\frac{3}{11}$
41. There are 3 red, 4 black, and 5 white balls in an urn. If two balls are randomly taken, what is the probability that neither is red?  
(a)  $\frac{5}{11}$  (b)  $\frac{6}{11}$  (c)  $\frac{3}{11}$  (d)  $\frac{5}{22}$
42. A jar contains 6 blue and 4 green marbles. If two marbles are drawn at random, what is the probability that both are blue?  
(a)  $\frac{5}{18}$  (b)  $\frac{1}{3}$  (c)  $\frac{1}{2}$  (d)  $\frac{1}{4}$
43. A box has 7 black and 5 white balls. If one ball is drawn at random, what is the probability that it is not black?  
(a)  $\frac{7}{12}$  (b)  $\frac{5}{12}$  (c)  $\frac{1}{2}$  (d)  $\frac{1}{3}$
44. A bag contains 8 red and 6 white balls. If two balls are drawn at random, what is the probability that they are of different colors?  
(a)  $\frac{24}{91}$  (b)  $\frac{58}{91}$  (c)  $\frac{48}{91}$  (d)  $\frac{72}{91}$
45. A box contains 9 blue and 3 red balls. If two balls are randomly picked, what is the probability that at least one is red?  
(a)  $\frac{3}{11}$  (b)  $\frac{1}{3}$  (c)  $\frac{18}{33}$  (d)  $\frac{5}{11}$

Answer the next questions based on the following information.

A card is drawn from of pack of playing cards.

46. What is the probability that the card is a King?  
(a) 0.0192 (b) 0.25 (c) 0.5 (d) 0.0769
47.  $P(\text{The card is not from Diamonds})$ —  
(a)  $\frac{1}{2}$  (b) 0 (c)  $\frac{3}{4}$  (d)  $\frac{1}{4}$
48.  $P(\text{The card is red or Clubs})$   
(a)  $\frac{1}{4}$  (b)  $\frac{1}{2}$  (c)  $\frac{2}{3}$  (d)  $\frac{3}{4}$

Answer the next TWO questions based on the following information.

An urn contains 5 red, 7 blue, and 8 green balls.

49. What is the probability that the ball drawn is red?  
(a) 0.26 (b) 0.25 (c) 0.2 (d) 0.4
50.  $P(\text{The ball drawn is not blue})$ —  
(a)  $\frac{13}{20}$  (b) 0.5 (c)  $\frac{7}{20}$  (d)  $\frac{8}{20}$

## 1.5 Set-Problems

51. **Given**  $P(A \cup B) = 0.7$ ,  $P(A \cap B) = 0.2$ , **what are**  $P(A)$  **and**  $P(B)$ ?
- (a)  $P(A) = 0.5$  and  $P(B) = 0.4$  (b)  $P(A) = 0.4$  and  $P(B) = 0.6$   
(c)  $P(A) = 0.4$  and  $P(B) = 0.3$  (d)  $P(A) = 0.7$  and  $P(B) = 0.3$
52. **If**  $P(A) = 0.4$ ,  $P(B) = 0.5$ , **and**  $P(A \cup B) = 0.7$ , **what is**  $P(A \cap B)$ ?
- (a) 0.2 (b) 0.1 (c) 0.3 (d) 0.4
53. **Given**  $P(A) = 0.3$ ,  $P(A \cup B) = 0.6$ , **and**  $P(A \cap B) = 0.1$ , **what is**  $P(B)$ ?
- (a) 0.6 (b) 0.4 (c) 0.3 (d) 0.2
54. **If**  $P(A) = 0.5$ ,  $P(B) = 0.6$ , **and**  $P(A \cap B) = 0.3$ , **what is**  $P(A \cup B)$ ?
- (a) 0.8 (b) 0.9 (c) 0.7 (d) 1
55. **If**  $P(A) = 0.2$ ,  $P(B) = 0.3$ , **and**  $P(A \cup B) = 0.4$ , **what is**  $P(A \cap B)$ ?
- (a) 0.9 (b) 0.2 (c) 0.3 (d) 0.1
56. **Given**  $P(A) = 0.7$ ,  $P(A \cup B) = 0.9$ , **and**  $P(A \cap B) = 0.5$ , **what is**  $P(B)$ ?
- (a) 0.8 (b) 0.6 (c) 0.7 (d) 0.5

**Answer the next two questions based on the following information**

For two exhaustive events A & B,  $P(A) = 0.7$  and  $P(B) = 0.4$

57.  $P(A \cap B) = ?$
- (a) 0.1 (b) 0.3 (c) 0.6 (d) 1
58. **The events A & B are –**
- i. independent  
ii. dependent  
iii. not mutually exclusive
- Which one is correct?**
- (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii

**Answer the next three questions using the following information**

$$P(A) = \frac{1}{3}, P(B) = \frac{1}{2} \text{ \& } P(A \cup B) = \frac{7}{12}$$

59.  $P(A \cap B) = ?$
- (a)  $\frac{5}{12}$  (b)  $\frac{1}{2}$  (c)  $\frac{1}{4}$  (d)  $\frac{15}{16}$
60.  $P(A \cap \bar{B}) = ?$
- (a)  $\frac{1}{4}$  (b)  $\frac{3}{4}$  (c)  $\frac{5}{6}$  (d)  $\frac{1}{12}$
61. **What is the probability that B occurs or A does not occur?**
- (a)  $\frac{3}{4}$  (b)  $\frac{7}{12}$  (c)  $\frac{5}{12}$  (d)  $\frac{11}{12}$
- Answer the next three questions using the following information**  $P(C) = \frac{2}{5}$ ,  $P(D) = \frac{3}{4}$  &  $P(C \cup D) = \frac{9}{10}$
62.  $P(C \cap D) = ?$
- (a)  $\frac{1}{10}$  (b)  $\frac{1}{4}$  (c)  $\frac{7}{20}$  (d)  $\frac{4}{5}$

63.  $P(C \cap \bar{D}) = ?$   
 (a)  $\frac{1}{10}$  (b)  $\frac{2}{5}$  (c)  $\frac{2}{20}$  (d)  $\frac{3}{10}$
64. What is the probability that D occurs or C does not occur?  
 (a)  $\frac{17}{20}$  (b)  $\frac{7}{10}$  (c)  $\frac{3}{4}$  (d)  $\frac{11}{20}$
- Answer the next three questions using the following information **CHECK**  $P(E) = \frac{1}{4}, P(F) = \frac{3}{5}$  &  $P(E \cup F) = \frac{11}{20}$
65.  $P(E \cap F) = ?$   
 (a)  $\frac{1}{10}$  (b)  $\frac{3}{20}$  (c)  $\frac{7}{20}$  (d)  $\frac{1}{4}$
66.  $P(E \cap \bar{F}) = ?$   
 (a)  $\frac{1}{10}$  (b)  $\frac{1}{5}$  (c)  $\frac{3}{10}$  (d)  $\frac{1}{20}$
67. What is the probability that F occurs or E does not occur?  
 (a)  $\frac{11}{20}$  (b)  $\frac{4}{5}$  (c)  $\frac{3}{4}$  (d)  $\frac{9}{10}$
68. An un contains 10 red and 5 black balls. Two balls are drawn; what is the probability of getting two red balls?  
 (a)  $\frac{3}{7}$  (b)  $\frac{4}{7}$  (c)  $\frac{20}{21}$  (d)  $\frac{2}{21}$

## 2 Random Variables

### 2.1 Concept of Random Variable

69. Which is a discrete random variable?  
 (a) Age of students (b) Amount of Production in a factory  
 (c) Height of workers (d) Page size in word processing softwares
70. A set of sample points tabulated along with their respective probabilities is an example of —  
 (a) Probability distribution (b) Probability function  
 (c) Frequency distribution (d) Marginal probability distribution
71. How many conditions does a probability density function have?  
 (a) 2 (b) 3 (c) 4 (d) 5
72. A coin is tossed twice and no. of heads appeared is denoted by X. How many possible values of X are there?  
 (a) 1 (b) 2 (c) 0 (d) 3
73. Which one is a property of marginal probability density function?  
 (a)  $\int_x f(x^2) dx = 1$  (b)  $\int_x f(x^2) dx = 0.5$  (c)  $\int_x f(x) dx = 1$  (d)  $P(x \geq 1)$
74. Which one is NOT an example of a continuous random variable —  
 (a) Weight (b) Height (c) Time (d) Size of television
75. Integrated value of  $\frac{1}{4}x^4$  —  
 (a)  $\frac{1}{20}x^5$  (b)  $\frac{1}{20}x^5 + c$  (c)  $\frac{1}{5}x^4$  (d)  $\frac{5}{4}x^5$



76. The conditions of a probability distribution are—

- i.  $\sum P(X) = 1$
- ii.  $\sum P(X) = 0$
- iii.  $0 \leq P(X) \leq 1$

Which one is correct?

- (a) i and ii
- (b) i and iii
- (c) ii and iii
- (d) i, ii and iii

77. The conditions for a cumulative distribution function (CDF) are—

- i.  $F(x)$  is non-decreasing.
- ii.  $0 \leq F(x) \leq 1$
- iii.  $\lim_{x \rightarrow \infty} F(x) = 1$

Which one is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii, and iii

78. The properties of a discrete probability distribution table are—

- i.  $\sum P(X) = 1$
- ii.  $P(X) \geq 0$  for all  $X$
- iii. Each probability corresponds to a discrete value.

Which one is correct?

- (a) i and ii
- (b) ii and iii
- (c) i and iii
- (d) i, ii, and iii

79. What is  $F(\infty)$  for a distribution function  $F(x)$ ?

- (a)  $-\infty$
- (b) -1
- (c) 0
- (d) 1

80. What is  $F(-\infty)$  for a distribution function  $F(x)$ ?

- (a)  $-\infty$
- (b) -1
- (c) 0
- (d) 1

81. How many types of random variables are there?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

82. Which of the following is not a discrete random variable?

- (a) number of students
- (b) Weight
- (c) Number of heads in coin toss
- (d) Population

83. Which one is a property of a probability distribution?

- (a)  $P(x_i) = 0$
- (b)  $P(x_i \neq 1)$
- (c)  $\sum P(x_i) = 1$
- (d)  $\int_x P(X)dx \leq 1$

84. Which one is not a discrete random variable?

- (a) Summation two die throw outcome
- (b) Weight
- (c) Number of heads in five coin tosses
- (d) Released version number of a software

85. Which one is not a discrete random variable?

- (a) Number of students in a class
- (b) Weight of a package
- (c) Shoe size
- (d) Total goals scored in a match

86. Which variable type can skip certain whole numbers?

- (a) Number of chapters read in a day
- (b) Weight of a person
- (c) Number of floors in a building
- (d) Number of people boarding a train

87. Which one is an example of a discrete random variable?

- (a) The amount of liquid in a glass (b) Temperature readings at noon  
(c) Number of defective items in a batch (d) Exact age in years

88. Identify which one is not a discrete variable.

- (a) Number of cookies eaten (b) Height of students  
(c) Total cars in a parking lot (d) Number of siblings

89. Which one is a property of joint probability distribution?

- (a)  $P(X_i, Y_j) < 1$  (b)  $P(X_i, Y_j) = 0$  (c)  $P(X_i, Y_j) < 0$  (d)  $0 \leq P(X_i, Y_j) \leq 1$

## 2.2 Situation Set

Answer the next two questions based on the following information

X	0	1	2
P(x)	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$

90. What is  $F(1)$

- (a) 0.65 (b) 0.75 (c) 0.5 (d) 1

91.  $P(X \leq 1 \leq 3) =$

- (a) 0.75 (b) 0.70 (c) 0.95 (d) 1

Answer the next three questions based on the following information

X	0	1	2	3
P(X)	$\frac{1}{4}$	m	$\frac{1}{3}$	$\frac{1}{6}$

92. What is the value of m?

- (a)  $\frac{1}{3}$  (b)  $\frac{5}{12}$  (c)  $\frac{1}{4}$  (d)  $\frac{1}{6}$

93. Find  $F(2)$ .

- (a)  $\frac{1}{2}$  (b)  $\frac{3}{4}$  (c)  $\frac{5}{6}$  (d)  $\frac{2}{3}$

94. What is  $P(X > 1)$ ?

- (a)  $\frac{1}{2}$  (b)  $\frac{5}{12}$  (c)  $\frac{1}{3}$  (d)  $\frac{7}{12}$

Answer the next three questions based on the following information

X	1	2	3	4	5
P(X)	$\frac{1}{5}$	c	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{3}$

95. What is the value of c?

- (a)  $\frac{1}{3}$  (b)  $\frac{1}{4}$  (c)  $\frac{1}{20}$  (d)  $\frac{1}{6}$

96. Find  $P(2 < X \leq 4)$ .

- (a)  $\frac{5}{12}$  (b)  $\frac{1}{2}$  (c)  $\frac{5}{6}$  (d)  $\frac{2}{3}$

97. What is  $P(X \leq 3)$ ?

- (a)  $\frac{9}{20}$  (b)  $\frac{7}{10}$  (c)  $\frac{1}{2}$  (d)  $\frac{3}{4}$

Answer the next three questions based on the following information

x	1	2	3
P(x)	$\frac{1}{3}$	a	$\frac{1}{6}$

98. What is the value of a?

- (a)  $\frac{2}{3}$  (b)  $\frac{5}{6}$  (c)  $\frac{1}{2}$  (d) 1

99. Find  $P(2 < X \leq 3)$

- (a)  $\frac{5}{6}$  (b)  $\frac{2}{3}$  (c)  $\frac{1}{2}$  (d)  $\frac{1}{6}$

100. What is  $P(X < 3)$ ?

- (a)  $\frac{5}{6}$  (b)  $\frac{2}{3}$  (c)  $\frac{1}{9}$  (d)  $\frac{1}{7}$

Answer the next two questions based on the following information

x	1	2	3
P(x)	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

101. What is  $F(2)$ ?

- (a)  $\frac{2}{3}$  (b)  $\frac{5}{6}$  (c)  $\frac{1}{2}$  (d) 1

102.  $P(1 < X \leq 2)$

- (a)  $\frac{5}{6}$  (b)  $\frac{2}{3}$  (c)  $\frac{1}{2}$  (d)  $\frac{1}{6}$

Answer the next two questions based on the following information

$$f(x) = kx; 0 < x < 5$$

103. What is the value of  $P(2 < x < 3)$

- (a)  $\frac{4}{5}$  (b)  $\frac{3}{5}$  (c)  $\frac{2}{5}$  (d)  $\frac{1}{5}$

104.  $P(X > 0)$

- (a) 0.99 (b) 0.5 (c) 1 (d) 0

Answer the next two questions using the following information

x	1	2	3	4	5	6
P(x)	k	2k	3k	4k	5k	6k

105. What is the value of k?

- (a)  $\frac{7}{21}$  (b)  $\frac{5}{21}$  (c)  $\frac{1}{21}$  (d) 1

106. What is the type of variable X?

- (a) Discrete (b) Discrete random (c) Continuous (d) Continuous random

Answer the next THREE questions using the following information

$$P(x) = \frac{x+1}{k}; x = 1, 2, 3, 4$$

107. What is the value of k?

- (a) 10 (b) 11 (c) 14 (d) 15

108.  $F(2) = -$

- (a)  $\frac{2}{14}$  (b)  $\frac{3}{11}$  (c)  $\frac{5}{14}$  (d)  $\frac{5}{11}$

109.  $P(x)$  is a –

- (a) Joint probability distribution (b) Cumulative probability distribution  
(c) Probability mass function (d) Probability Density function

110. The example of a discrete random variable is–

- i. Binomial variate  
ii. Poisson variate  
iii. Normal variate

Which one is correct?

- (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii

111.  $f(x) = 2x; 0 < X < 3$ ; What is  $F(3)$ ?

- (a) 3 (b) 0 (c) 1 (d) 0

112.  $f(x) = 3x; 0 < X < 2$ ; What is  $F(2)$ ?

- (a) 6 (b) 3 (c) 1 (d) 0

113.  $f(x) = x^2; 0 < X < 4$ ; What is  $F(4)$ ?

- (a) 16 (b) 0 (c) 4 (d) 1

114.  $f(x) = 4 - x; 1 < X < 5$ ; What is  $F(5)$ ?

- (a) 3 (b) 0 (c) 1 (d) 4

Answer the next two questions based on the following information:

$$P(x, y) = \frac{1}{21}(x + y); x = 1, 2, 3 \text{ and } y = 1, 2$$

115.  $P(x) = ?$

- (a)  $P(x) = \frac{2x+3}{21}$  (b)  $P(x) = \frac{x+3}{27}$  (c)  $P(x) = \frac{4x+3}{21}$  (d)  $P(x) = \frac{2x+5}{21}$

116.  $P(y) = ?$

- (a)  $\frac{y+2}{7}$  (b)  $\frac{y+3}{7}$  (c)  $\frac{3y+2}{7}$  (d)  $\frac{y+2}{9}$

117. If  $f(x) = kx^3; -1 \leq x \leq 1$ , then k is

- i) positive  
ii) negative  
iii) lies from -1 to 1  
(a) i (b) ii (c) iii (d) i and ii

Answer the next two questions based on the following information.

x	4	5	6	3	2	1
P(X)	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

118. The value of  $P(3 < X < 5)$  is:

- (a)  $\frac{1}{2}$  (b)  $\frac{1}{6}$  (c)  $\frac{1}{3}$  (d) 0

119.  $P(x \neq 2)$  is :

(a)  $\frac{5}{6}$

(c) 1

(b) 0

(d) Can't be found from this information

### 3 Mathematical Expectation

120.  $E(X) + E(Y) = ?$

- (a)  $E(X) - E(Y)$       (b)  $E(X) + E(Y)$       (c)  $2E(X) - E(Y)$       (d)  $E(X) \times E(Y)$

Answer the next THREE questions based on the following information

X	0	1	2
P(x)	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{5}{12}$

121. What is the value of  $E(X)$

- (a)  $\frac{15}{12}$       (b)  $\frac{13}{12}$       (c)  $\frac{1}{12}$       (d)  $\frac{11}{13}$

122. What is the value of  $E(X^2)$

- (a)  $\frac{25}{12}$       (b)  $\frac{13}{12}$       (c)  $\frac{23}{12}$       (d)  $\frac{25}{13}$

123. What is  $V(2X)$ ?

- (a) 2.93      (b) 2.91      (c) 1.97      (d) 2.97

124. What is the expected value of the squared deviation of the value of the random variable from their mean?

- (a) Arithmetic Mean      (b) Expectation      (c) Variance      (d) Co-variance

125. What is the minimum value of variance a random variable?

- (a)  $-\infty$       (b) 1      (c) 0      (d) -1

126. If  $y = ax + b$ , what is the value of  $V(y)$ ?

- (a)  $aV(X)$       (b)  $a^2V(X)$       (c)  $V(X)$       (d)  $a^2$

127. If  $y = ax + b$ , what is the value of  $E(y)$ ?

- (a)  $aE(X) + b$       (b)  $a^2E(X)$       (c)  $E(X)$       (d)  $b$

128. What is the value of  $V(5)$ ?

- (a) 0      (b) 25      (c) 5      (d) 1

129. If  $P(x) = \frac{1}{n}; x = 1, 2, 3, \dots, n$ , what is the value of  $E(X)$ ?

- (a)  $\frac{n}{2}$       (b)  $\frac{n-1}{2}$       (c)  $\frac{n+1}{2}$       (d)  $n + 1$

130. If  $P(x) = \frac{4 - |5 - x|}{k}; x = 2, 3, 4, \dots, 8$ , what is the value of k?

- (a) 5      (b) 8      (c) 16      (d) 24

131. Expected value of a constant a is –

- (a) 1      (b) Variance      (c) a      (d)  $a+1$

132. The variance of a constant m is –

- (a) 0      (b) 1      (c) m      (d)  $m^2$

133. What is  $V(X - Y)$  equal to?

- (a)  $V(X) + V(Y)$       (b)  $V(X) + V(Y) - 2Cov(X, Y)$   
 (c)  $V(X) - V(Y)$       (d)  $V(X) + V(Y) + 2Cov(X, Y)$

134. What is the value of  $V(2X+5)$ ?  
 (a)  $4V(X) - 5$  (b) 20 (c)  $4V(X)$  (d) 0
135. If  $P(x) = \frac{1}{20}; x = 1, 2, 3, \dots, 20$ , what is the standard deviation?  
 (a) 1 (b) 5.77 (c) 7.75 (d) 12.57
136. Expectation measures –  
 (a) Dispersion (b) Skewness (c) Kurtosis (d) Central tendency
137. If  $E(X) = -0.5$ , then  $E(1 - 2X) = ?$   
 (a) 0 (b) -1 (c) 2 (d) 1
138. If  $P(X) = \frac{1}{10}; x = 1, 2, \dots, 10$ , then  $E(X) = ?$   
 (a) 10 (b) 5.5 (c) 0 (d) 11
139. Which formula of variance is correct?  
 (a)  $V(X + Y) = V(X) + V(Y) - 2Cov(X, Y)$  (b)  $V(X + Y) = V(X) + V(Y) + 2Cov(X, Y)$   
 (c)  $V(X + Y) = V(X) + V(Y) - 2Cov(X, Y)$  (d)  $V(X + Y) = V(X) - V(Y) + 2Cov(X, Y)$
140.  $X$  is a constant; what is the value of  $V(\frac{X}{2})$ ?  
 i) 0  
 ii)  $\frac{1}{2}$   
 iii)  $\frac{1}{4}$   
 (a) ii (b) i (c) iii (d) i and iii
141. If  $E(X) = 2, E(X^2) = 8, V(X) = --$   
 (a) 0 (b) 2 (c) 4 (d) 8
142. If  $E(X) = 3, E(X^2) = 11, V(X) = --$   
 (a) 2 (b) 5 (c) 6 (d) 4
143. If  $E(X) = 4$ , what is  $E(3X - 2)$ ?  
 (a) 10 (b) 8 (c) 7 (d) 6
144. If  $E(X) = 5, E(X^2) = 30, V(X) = --$   
 (a) 3 (b) 5 (c) 4 (d) 6
145. If  $E(X) = 6$ , what is  $E(\frac{X}{2} + 1)$ ?  
 (a) 4 (b) 3 (c) 2 (d) 5
146. If  $E(X) = 2, E(X^2) = 10, V(X) = --$   
 (a) 5 (b) 6 (c) 7 (d) 4
147. If  $E(X) = 7$ , what is  $E(4X + 3)$ ?  
 (a) 28 (b) 30 (c) 31 (d) 29
148. If  $E(X) = 3$ , what is  $E(5 - X)$ ?  
 (a) 2 (b) 3 (c) 4 (d) 5
149. If  $E(X) = 4$  and  $V(X) = 5$ , what is  $E(X^2)$ ?  
 (a) 9 (b) 16 (c) 21 (d) 25

150. If  $E(X) = 3$  and  $V(X) = 7$ , what is  $E(X^2)$ ?  
 (a) 9 (b) 10 (c) 16 (d) 18
151. If  $E(X) = 5$  and  $E(X^2) = 34$ , what is  $V(X)$ ?  
 (a) 6 (b) 9 (c) 10 (d) 7
152. If  $E(X) = 2$  and  $E(X^2) = 14$ , what is  $V(X)$ ?  
 (a) 10 (b) 9 (c) 8 (d) 7
153. If  $E(X) = 6$  and  $V(X) = 12$ , what is  $E(X^2)$ ?  
 (a) 36 (b) 40 (c) 48 (d) 50
154. If  $P(x) = \frac{4-|5-x|}{k}; x = 2, 3, 4, \dots, 8$ , what is the value of  $E(X)$ ?  
 (a) 3 (b) 8 (c) 16 (d) 5
155. If  $P(x) = \frac{6-|7-x|}{k}; x = 2, 3, 4, \dots, 12$ , what is the value of  $E(X)$ ?  
 (a) 6 (b) 9 (c) 13 (d) 36
156. If  $P(x) = \frac{3-|4-x|}{k}; x = 2, 3, 4, \dots, 6$ , what is the value of  $k$ ?  
 (a) 6 (b) 9 (c) 10 (d) 40
157. If the variance of  $X$  is 3, what is the variance of  $V(3)$ ?  
 (a) 1 (b) 2 (c) 3 (d) 0
158. If  $V(X) = 5$ , what is  $V(X + 5)$ ?  
 (a) 0 (b) 5 (c) 10 (d) 25
159. If  $V(X) = 5$ , what is  $V(2X + 5)$ ?  
 (a) 20 (b) 5 (c) 10 (d) 25
160. If  $E(X) = 2$  and  $E(X^2) = 8$ , then the value of the  $V(X) =$ ?  
 (a) 0 (b) 2 (c) 4 (d) 8
161. If  $E(X^2) = 20$  and  $V(X) = 11$ , what is  $E(X)$ ?  
 (a) 3 (b) 4 (c) 5 (d) 6
162. If  $E(X^2) = 50$  and  $V(X) = 14$ , what is  $E(X)$ ?  
 (a) 5 (b) 6 (c) 7 (d) 8
163. If  $E(X^2) = 25$  and  $V(X) = 9$ , what is  $E(X)$ ?  
 (a) 2 (b) 3 (c) 4 (d) 5
164. If  $E(X^2) = 45$  and  $V(X) = 21$ , what is  $E(X)$ ?  
 (a)  $4\sqrt{3}$  (b)  $2\sqrt{6}$  (c)  $6\sqrt{2}$  (d)  $7\sqrt{2}$
165. If  $E(X^2) = 13$  and  $V(X) = 4$ , what is  $E(X)$ ?  
 (a) 2 (b) 3 (c) 4 (d) 5
166. If  $E(X) = 3$ , what is  $E(2X - 5)$ ?  
 (a) 1 (b) 3 (c) 5 (d) 7
167. If  $E(X) = 4$ , what is  $E(\frac{X}{2} + 3)$ ?  
 (a) 4 (b) 5 (c) 6 (d) 7



168. If  $E(X) = -2$ , what is  $E(3X + 7)$ ?

- (a) 1 (b) -1 (c) -2 (d) 4

169. If  $E(X) = 6$ , what is  $E(5 - X)$ ?

- (a) 1 (b) 0 (c) -1 (d) 2

170. If  $E(X) = 10$ , what is  $E(4X - 8)$ ?

- (a) 12 (b) 40 (c) 28 (d) 32

171. If  $P(x) = \frac{1}{15}; x = 1, 2, 3, \dots, 15$ , what is the value of the expectation?

- (a) 8.5 (b) 7.5 (c) 7 (d) 8

**Answer the next two questions based on the following information**

The probability function of random variable  $x$  is given below:

$$P(x) = \frac{x}{k}; x = 1, 2, 3, 4$$

172. What is the value of  $k$ ?

- (a) 6 (b) 10 (c) 15 (d) 20

173. What is  $E(X)$ ?

- (a) 2.25 (b) 3.5 (c) 2.5 (d) 3.0

**Answer the next three questions based on the following information**

The probability function of random variable  $x$  is given below:

$$P(x) = \frac{2x+1}{k}; x = 1, 2, 3, 4$$

174. What is the value of  $k$ ?

- (a) 18 (b) 25 (c) 12 (d) 24

175. What is  $E(X)$ ?

- (a) 1.75 (b) 2.92 (c) 3.25 (d) 2.25

176. What is  $V(X)$ ?

- (a) 1.05 (b) 3.0 (c) 1.5 (d) 1.25

**Answer the next two questions based on the following information**

The probability function of random variable  $x$  is given below

$$P(x) = \frac{x-1}{k}; x = 2, 3, 4, 5$$

177. What is the value of  $k$ ?

- (a) 2 (b) 5 (c) 10 (d) 25

178. What is  $E(X)$ ?

- (a) 0.425 (b) 0.525 (c) 0.725 (d) 0.625

## 4 Binomial Distribution

179. How many parameters are there in a binomial distribution?  
(a) 1 (b) 2 (c) 3 (d) 4
180. What is the Mean of Binomial Distribution?  
(a)  $np$  (b)  $npq$  (c)  $nq$  (d)  $\sqrt{npq}$
181. What is the Variance of Binomial Distribution?  
(a)  $np$  (b)  $npq$  (c)  $nq$  (d)  $\sqrt{npq}$
182. What is the Standard Deviation of Binomial Distribution?  
(a)  $np$  (b)  $npq$  (c)  $nq$  (d)  $\sqrt{npq}$
183. What is the Coefficient of Variation of Binomial Distribution?  
(a)  $np$  (b)  $npq$  (c)  $\frac{q}{np}$  (d)  $\sqrt{npq}$
184. Which is true of mean ( $np$ ) of Binomial Distribution?  
(a)  $np = 0$  (b)  $np < 0$  (c)  $np > 0$  (d)  $np \neq 0$
185. In a Binomial distribution, how are mean and variance related?  
(a)  $Mean > Variance$  (b)  $Mean < Variance$   
(c)  $Mean = Variance$  (d)  $Mean = 2 \times Variance$
186. When does Binomial distribution tend to Poisson distribution?  
(a)  $n \rightarrow \infty$  and  $p \rightarrow \infty$  (b)  $n \rightarrow 0$  and  $p \rightarrow 0$  (c)  $n \rightarrow \infty$  and  $p \rightarrow 0$  (d)  $n \rightarrow 0$  and  $p \rightarrow \infty$
- Answer the next two questions based on the following information.**  
X is a binomial variate with expectation 4 and standard deviation  $\sqrt{3}$ .
187. What are the values of the parameters (mean and probability)?  
(a)  $16, \frac{1}{4}$  (b)  $16, \frac{3}{4}$  (c)  $15, \frac{1}{4}$  (d)  $10, \frac{1}{4}$
188. What is  $P(X \neq 0)$ ?  
(a) 0 (b) 0.01 (c) 0.99 (d) 1
189. The characteristics of binomial distribution—  
i.  $E(X) > V(X)$   
ii.  $E(X) = V(X)$   
iii.  $E(X) = np$   
**Which one is correct?**  
(a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
190. What is true of binomial distribution?  
(a) There is one parameter (b) Number of trial is fixed  
(c) Mean is greater than variance (d) Skewness is negative
191. What is the skewness of binomial distribution?  
(a)  $\frac{(q-p)^2}{np}$  (b)  $\frac{(q-p)^2}{np}$  (c)  $\frac{(p+1)^2}{npq}$  (d)  $\frac{(q+p)^2}{npq}$

192. When is a binomial distribution positively skewed?

- (a)  $p > q$                       (b)  $p = q$                       (c)  $p < q$                       (d)  $p+q < 1$

Answer the next two questions based on the following information

In a binomial distribution,  $P(x = 4) = \frac{1}{2}P(x = 5); n = 10$

193. What is the mean?

- (a) 6.25                      (b) 5.15                      (c) 8.52                      (d) 5.22

194.  $P(x = 2) = \text{---}$

- (a) 0.0053                      (b) 0.0069                      (c) 0.0085                      (d) 0.94

195. In a binomial distribution with  $p = 0.3$  and  $n = 10$ , what is  $P(2)$ ?

- (a) 0.2335                      (b) 0.2668                      (c) 0.3828                      (d) 0.1211

196. In a binomial distribution with  $p = 0.4$  and  $n = 12$ , what is  $P(3)$ ?

- (a) 0.0896                      (b) 0.2131                      (c) 0.1419                      (d) 0.2942

197. In a binomial distribution with  $p = 0.5$  and  $n = 8$ , what is  $P(4)$ ?

- (a) 0.2734                      (b) 0.3125                      (c) 0.2070                      (d) 0.0898

198. In a binomial distribution with  $p = 0.2$  and  $n = 15$ , what is  $P(5)$ ?

- (a) 0.1789                      (b) 0.1887                      (c) 0.1032                      (d) 0.2413

199. In a binomial distribution with  $p = 0.6$  and  $n = 9$ , what is  $P(6)$ ?

- (a) 0.2007                      (b) 0.2508                      (c) 0.2311                      (d) 0.7682

200. In a binomial distribution with  $p = 0.3$  and  $P(x) = 0.2508, n = 9, x = ?$

- (a) 18                      (b) 10                      (c) 13                      (d) 6

201. In a binomial distribution with  $p = 0.4$  and  $P(x) = 0.2253, n = ?$

- (a) 5                      (b) 6                      (c) 12                      (d) 15

202. In a binomial distribution with  $p = 0.5$  and  $P(x) = 0.6367, n = ?$

- (a) 15                      (b) 1                      (c) 8                      (d) 0.0898

203. In a binomial distribution with  $p = 0.2$  and  $P(x) = 0.9389, n = ?$

- (a) 7                      (b) 12                      (c) 11                      (d) 15

204. In a binomial distribution with  $p = 0.6$  and  $P(x) = 0.7682, n = ?$

- (a) 3                      (b) 9                      (c) 10                      (d) 14

## 4.1 Multiple Completion

205. In a binomial distribution with parameters  $n$  and  $p$ :

- i. The expected value is given by  $E(X) = np$ .
- ii. The variance is given by  $V(X) = np(1 - p)$ .
- iii. The standard deviation is given by  $\sqrt{np}$ .

Which one is correct?

- (a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii

206. Which of the following statements about a binomial distribution are true?

- i. The probability of success remains constant for each trial.
- ii. The trials are dependent on each other.
- iii. The number of trials is fixed in advance.

Which one is correct?

- (a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii

207. Consider a binomial experiment. Which of the following statements is/are true?

- i. Each trial results in exactly one of two possible outcomes.
- ii. The expected value is always greater than the variance.
- iii. The probability mass function of a binomial distribution can be computed using the binomial formula.

Which one is correct?

- (a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii

208. Which of the following is/are correct about the binomial distribution?

- i. The variance is maximized when  $p = 0.5$ .
- ii. If  $p = 1$ , the distribution becomes degenerate.
- iii. The standard deviation is given by  $\sqrt{np(1-p)}$ .

Which one is correct?

- (a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii

## 5 Poisson Distribution

209. The no. of parameters in a Poisson distribution is —

- (a) 1                      (b) 2                      (c) 3                      (d) 4

210. What is the mean of Poisson distribution

- (a)  $\frac{1}{\sqrt{m}}$                       (b)  $m$                       (c)  $\frac{1}{m}$                       (d)  $1 + \frac{1}{m}$

211. Which relationship between mean and variance of Poisson Distribution is correct?

- (a)  $Mean > Variance$     (b)  $Mean < Variance$     (c)  $Mean = Variance$     (d)  $Mean \neq Variance$

212. What is the Variance of Poisson Distribution(with parameter  $m$ )?

- (a)  $\frac{1}{\sqrt{m}}$                       (b)  $\frac{1}{m}$                       (c)  $m$                       (d)  $\frac{1}{m+1}$

213. What is the Standard Deviation of Poisson Distribution(with parameter  $m$ )?

- (a)  $\frac{1}{\sqrt{m}}$                       (b)  $\frac{1}{m}$                       (c)  $\sqrt{m}$                       (d)  $\frac{1}{m+1}$

214. Which one is true of the parameter ( $m$ ) of Poisson Distribution?

- (a)  $m = 0$                       (b)  $m < 0$                       (c)  $m > 0$                       (d)  $m = 1$

215. The parameter of a Poisson Distribution is 5. What is its mean?

- (a) 2                      (b) 5                      (c) 2.24                      (d) 25

216. When does Binomial Distribution tend to Poisson Distribution?

- (a)  $n \rightarrow \infty, p \rightarrow 0$  &  $np$  is finite                      (b)  $n \rightarrow \infty, p \rightarrow 0$  &  $np$  is infinite  
(c)  $n \rightarrow \infty, p \rightarrow \infty$  &  $np$  is finite                      (d)  $n \rightarrow 0, p \rightarrow \infty$  &  $np$  is infinite

217. The parameter of a Poisson variate is 2. What is its variance?  
 (a) 0 (b) 4 (c)  $\sqrt{2}$  (d) 2
218. The parameter of a Poisson variate is 5. What is its variance?  
 (a) 10 (b) 5 (c)  $\sqrt{5}$  (d) 25
219. A Poisson distribution has a mean of 3. What is the variance?  
 (a) 9 (b) 3 (c)  $\sqrt{3}$  (d) 0
220. X is a Poisson variate.  $P(2) = P(4)$ . What is the value of the parameter?  
 (a) 12 (b) 3.46 (c) 3.6 (d) 4
221. X is a Poisson variate.  $P(3) = P(5)$ . What is the value of the parameter?  
 (a) 4.5 (b) 5 (c) 2.3 (d) 4.1
222. For a Poisson variate X, if  $P(1) = P(3)$ , what is the variance?  
 (a) 2.5 (b) 3.2 (c) 2.45 (d) 4.5
- Answer the next two questions based on the following information  
 For a Poisson variate X, if  $P(2) = P(5)$ .
223. What is standard deviation?  
 (a) 1.978 (b) 1.998 (c) 1.989 (d) 1.889
224. What is the value of  $P(2)$ ?  
 (a) 0.25 (b) 0.14 (c) 0.15 (d) 0.02
225. The standard deviation of a poisson distribution is 2. What is the parameter?  
 (a) 2 (b) 3 (c) 4 (d) 5
226. Mean of a Poisson variate is a. What is its standard deviation?  
 (a) 0 (b) a (c)  $a^{\frac{1}{2}}$  (d)  $a^2$
227. The standard deviation of a Poisson distribution is 3. What is the parameter?  
 (a) 6 (b) 9 (c) 3 (d) 4
228. For a Poisson distribution with a mean of 5, what is the variance?  
 (a) 5 (b) 10 (c) 25 (d) 15
229. If the variance of a Poisson distribution is 4, what is  $P(2)$ ?  
 (a) 0.1465 (b) 0.1954 (c) 0.1839 (d) 0.2184
230. If the variance of a Poisson distribution is 3.5, what is  $P(1)$ ?  
 (a) 0.1465 (b) 0.1057 (c) 0.1839 (d) 0.2184
231. A Poisson distribution has a mean of 7. What is the standard deviation?  
 (a) 3.2 (b) 4.1 (c) 2.65 (d) 1.78
232. If  $P(2)$  in a Poisson distribution with parameter  $\lambda$  equals 0.2240, what is the parameter  $\lambda$ ?  
 (a) 2.4551 (b) 1.2515 (c) 1.2115 (d) 2.5112
233. A Poisson distribution has a mean of 4. What is  $P(3)$ ?  
 (a) 0.1465 (b) 0.1954 (c) 0.1839 (d) 0.2381

234. If the variance of a Poisson distribution is 3, what is the mean?  
 (a) 3 (b)  $\sqrt{3}$  (c) 2 (d) 6
235. For a Poisson distribution with mean 6, what is the probability of  $P(0)$ ?  
 (a) 0.0895 (b) 0.012 (c) 0.0454 (d) 0.0024
236. The mean of a Poisson distribution is 10. What is its standard deviation?  
 (a) 5 (b)  $\sqrt{10}$  (c) 10 (d)  $\sqrt{20}$
237. Given that the parameter of a Poisson distribution is 8, what is the variance?  
 (a) 4 (b) 8 (c)  $\sqrt{8}$  (d) 16

## 5.1 Multiple Completion

238. For a Poisson-distributed variable with mean  $\lambda = 4$ , which of the following is true?  
 i.  $E(X) = 4$   
 ii.  $V(X) = 2$   
 iii.  $E(X^2) = 18$   
**Which one is correct?**  
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
239. If  $X \sim \text{Poisson}(m = 3)$ , which of the following holds?  
 i.  $E(X) = 3$   
 ii.  $V(X) = 3$   
 iii.  $E(X^2) = 12$   
**Which one is correct?**  
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
240. For a Poisson distribution, which of the following statements are true?  
 i. The mean and variance are always equal.  
 ii. The distribution is always symmetric.  
 iii. The probability of zero occurrences is given by  $e^{-m}$ .  
**Which one is correct?**  
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
241. If a Poisson-distributed random variable has mean  $\lambda = 6$ , which of the following statements is true?  
 i.  $E(X) = 6$   
 ii.  $V(X) = 6$   
 iii.  $P(X = 0) = e^{-6}$   
**Which one is correct?**  
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
242. For a Poisson process with  $\lambda = 5$ , which of the following is true?  
 i. The standard deviation is  $\sqrt{5}$ .  
 ii.  $P(X \geq 1) = 1 - e^{-5}$ .  
 iii.  $E(X^2) = 30$   
**Which one is correct?**  
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii

## 5.2 Problems

243. On average, 1 in 1000 houses in a city gets a fire-burn in a year. If there are 2000 houses, what is the probability that, in a certain year, exactly 5 houses will be burnt?
- (a) 0.036                      (b) 0.040                      (c) 0.027                      (d) 0.091

## 6 Vital Statistics

244. What is called the ratio of the dependent population to the earning population?
- (a) Dependency ratio      (b) Sex ratio                      (c) Population density      (d) Growth rate
245. Which of the following best describes the dependency ratio?
- (a) The ratio of the elderly population to the working-age population  
(b) The ratio of the combined non-working (0-14 and 65+) population to the working-age (15-64) population  
(c) The proportion of young dependents (0-14) in the population  
(d) The total population divided by the number of children (0-14)
246. City A has 12,000 individuals aged 0-14, 35,000 aged 15-64, and 5,000 aged 65+. What is the dependency ratio?
- (a) 0.31                      (b) 0.48                      (c) 0.60                      (d) 0.25
247. A City has a dependency ratio of 0.52. If its working-age population (15-64) is 50,000, what is the total number of dependents (0-14 and 65+)?
- (a) 15,600                      (b) 20,000                      (c) 26,000                      (d) 30,000

Answer the following 2 questions based on the information given below.

City	Population (in thousands)	Area (in km <sup>2</sup> )
Gamma	1200	400
Delta	800	320

248. What is the population density of City Delta?
- (a) 2 people/km<sup>2</sup>                      (b) 4 people/km<sup>2</sup>                      (c) 2.5 people/km<sup>2</sup>                      (d) 2.2 people/km<sup>2</sup>
249. Which city is less densely populated?
- (a) Gamma    (b) Delta  
(c) Both are equal                                      (d) Cannot be determined

Answer the following two questions based on the information given below.

In a city, the total number of live births in a year was 2,400. The number of women aged 15-49 years in the population was 48,000.

250. Calculate the General Fertility Rate (GFR) for the city.
- (a) 40 per 1,000 women      (b) 50 per 1,000 women      (c) 60 per 1,000 women      (d) 30 per 1,000 women
251. If live births increase to 3,000 while the number of women aged 15-49 remains the same, what is the new GFR?
- (a) 55 per 1,000 women      (b) 65 per 1,000 women      (c) 50 per 1,000 women      (d) 62.5 per 1,000 women

252. The population of a city is 500,000, and the number of live births recorded in a year is 8,000. What is the Crude Birth Rate (CBR)?

- (a) 12 per 1,000      (b) 16 per 1,000      (c) 20 per 1,000      (d) 22 per 1,000

253. What is the formula of population density?

- (a)  $\frac{M}{F} \times 100$       (b)  $\frac{F}{M} \times 100$       (c)  $\frac{B}{P} \times 100$       (d)  $\frac{P}{A}$

254. In the following data, what is the dependency ratio?

Age	0-14	15-24	25-34	35-44	45-54	55-64	65+
Populataion	31,500	40,000	48,000	41,000	32,000	25,000	16,000

- (a) 35.54%      (b) 25.54%      (c) 23.24%      (d) 31.25%

255. Crude Birth Rate (CBR) is:

- (a)  $\frac{B}{P} \times 100$       (b)  $\frac{B}{P} \times 1000$       (c)  $\frac{P}{B} \times 100$       (d)  $\frac{F}{P} \times 100$

256. Which one is a measure of reproduction?

- i) CBR  
ii) CDR  
iii) NRR

- (a) i      (b) ii      (c) iii      (d) i and ii

257. The number of people living per unit area is called–

- (a) Population Index      (b) Population Density  
(c) Human Development Index      (d) Dependency Ratio

258. Which formula of GFR is accurate?

- (a)  $GFR = \frac{B}{P} \times 1000$       (b)  $GFR = \frac{B}{F_{15-49}} \times 1000$   
(c)  $GFR = \frac{B_i}{F_i} \times 1000$       (d)  $GFR = \frac{G_i}{F_{15-49}} \times 1000$

259. Total number of children born to each 1000 people in any country or region is called –

- (a) TFR      (b) GFR      (c) CBR      (d) GRR

Answer the next two questions based on the following information

Year	1	2	3	4
Population	100	110	120	130

260. Which type of growth is seen here?

- (a) Arithmetic growth      (b) Geometric growth      (c) Exponential growth      (d) None

261. What is the rate of increase?

- (a) 1      (b) 0.1      (c) 10      (d) 1%

262. In exponential growth, when is a population doubled?

- (a)  $\frac{\log_{10} 2}{r}$       (b)  $\frac{\log_e 2}{r}$       (c)  $\frac{\log_e 2}{r^2}$       (d)  $\frac{\log_e 3}{r}$

263. If a population exponentially declines, when is it reduced to half?

- (a)  $\frac{\log_{10} 2}{r}$       (b)  $\frac{\log_e 2}{r}$       (c)  $\frac{\log_e 2}{r^2}$       (d)  $\frac{\log_e 3}{r}$



264. How long does it take for a population to triple in exponential growth?

- (a)  $\frac{\log_{10} 3}{r}$                       (b)  $\frac{\log_e 3}{r}$                       (c)  $\frac{\log_e 3}{r^2}$                       (d)  $\frac{\log_e 2}{r}$

Answer the next two questions based on the following information

Statement

265. Vital statistics records –

- i. marriage
- ii. birth
- iii. sickness and death

Which one is correct?

- (a) i and ii                      (b) i and iii                      (c) ii and iii                      (d) i, ii and iii

**Answer Key:**

1. (c) 6
2. (b) 6
3. (a)  $\frac{n!}{(n-r)!}$
4. (a)  $\frac{n!}{(n-1)!(n+r)!}$
5. (c) 1
6. (b) 0
7. (b) 2
8. (a) Disjoint
9. (a)  $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$
10. (a)  $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$
11. (a)  $P(A|B) = \frac{P(A \cap B)}{P(B|A)}$
12. (c)  $P(A_1 U A_2 U \dots U A_n) = \sum_{i=1}^{\infty} P(A_i)$
13. (c) ii and iii
14. (b) Experiment
15. (c) An impossible event
16. (a) Complementary events
17. (c) 0
18. (d) Sample Point
19. (c) Mutually Exclusive Events
20. (a)  $P(A \cap B) = P(A) \cdot P(B)$
21. (c) 0.90
22. (b) 0.85
23. (b) 0.92
24. (c) 0.88
25. (c) 0.975
26. (c)  $6^r$
27. (c)  $2^r$
28. (c) 8
29. (a)  $\frac{1}{4}$
30. (c)  $\frac{3}{4}$
31. (b)  $\frac{1}{2}$
32. (a)  $\frac{1}{4}$
33. (c)  $\frac{3}{4}$
34. (c)  $\frac{1}{4}$
35. (a)  $\frac{3}{4}$
36. (a) An experiment
37. (b)  $\frac{0}{6}$
38. (a) 4
39. (c) 36
40. (b)  $\frac{1}{22}$
41. (b)  $\frac{6}{11}$
42. (b)  $\frac{1}{3}$
43. (b)  $\frac{5}{12}$
44. (c)  $\frac{48}{91}$
45. (d)  $\frac{5}{11}$
46. (d) 0.0769
47. (c)  $\frac{3}{4}$
48. (d)  $\frac{3}{4}$
49. (a) 0.26
50. (a)  $\frac{13}{20}$
51. (a)  $P(A) = 0.5$  and  $P(B) = 0.4$
52. (a) 0.2
53. (b) 0.4
54. (c) 0.7
55. (d) 0.1
56. (c) 0.7
57. (a) 0.1
58. (c) ii and iii
59. (c)  $\frac{1}{4}$
60. (a)  $\frac{1}{4}$
61. (d)  $\frac{11}{12}$
62. (b)  $\frac{1}{4}$
63. (c)  $\frac{2}{20}$
64. (a)  $\frac{17}{20}$
65. (b)  $\frac{3}{20}$
66. (a)  $\frac{1}{10}$
67. (d)  $\frac{9}{10}$
68. (a)  $\frac{3}{7}$
69. (d) Page size in word processing softwares
70. (a) Probability distribution

71. (b) 3
72. (d) 3
73. (c)  $\int_x f(x) dx = 1$
74. (d) Size of television
75. (b)  $\frac{1}{20}x^5 + c$
76. (b) i and iii
77. (d) i, ii, and iii
78. (d) i, ii, and iii
79. (d) 1
80. (c) 0
81. (a) 2
82. (b) Weight
83. (c)  $\Sigma P(x_i) = 1$
84. (d) Released version number of a software
85. (b) Weight of a package
86. (c) Number of floors in a building
87. (c) Number of defective items in a batch
88. (b) Height of students
89. (d)  $0 \leq P(X_i, Y_j) \leq 1$
90. (b) 0.75
91. (a) 0.75
92. (c)  $\frac{1}{4}$
93. (c)  $\frac{5}{6}$
94. (a)  $\frac{1}{2}$
95. (c)  $\frac{1}{20}$
96. (a)  $\frac{5}{12}$
97. (c)  $\frac{1}{2}$
98. (c)  $\frac{1}{2}$
99. (d)  $\frac{1}{6}$
100. (a)  $\frac{5}{6}$
101. (b)  $\frac{5}{6}$
102. (c)  $\frac{1}{2}$
103. (d)  $\frac{1}{5}$
104. (c) 1
105. (c)  $\frac{1}{21}$
106. (b) Discrete random
107. (c) 14
108. (c)  $\frac{5}{14}$
109. (c) Probability mass function
110. (a) i and ii
111. (c) 1
112. (c) 1
113. (d) 1
114. (c) 1
115. (a)  $P(x) = \frac{2x+3}{21}$
116. (c)  $\frac{3y+2}{7}$
117. (a) i
118. (b)  $\frac{1}{6}$
119. (a)  $\frac{5}{6}$
120. (b)  $E(X) + E(Y)$
121. (b)  $\frac{13}{12}$
122. (b)  $\frac{13}{12}$
123. (d) 2.97
124. (c) Variance
125. (c) 0
126. (b)  $a^2V(X)$
127. (a)  $aE(X) + b$
128. (a) 0
129. (c)  $\frac{n+1}{2}$
130. (c) 16
131. (c) a
132. (a) 0
133. (c)  $V(X) - V(Y)$
134. (c)  $4V(X)$
135. (a) 1
136. (d) Central tendency
137. (c) 2
138. (b) 5.5
139. (b)  $V(X + Y) = V(X) + V(Y) + 2Cov(X, Y)$
140. (b) i
141. (c) 4
142. (a) 2
143. (a) 10
144. (b) 5
145. (a) 4

146. (b) 6
147. (c) 31
148. (a) 2
149. (c) 21
150. (c) 16
151. (b) 9
152. (a) 10
153. (c) 48
154. (d) 5
155. (d) 36
156. (b) 9
157. (d) 0
158. (b) 5
159. (a) 20
160. (c) 4
161. (a) 3
162. (b) 6
163. (c) 4
164. (b)  $2\sqrt{6}$
165. (c) 4
166. (a) 1
167. (b) 5
168. (a) 1
169. (c) -1
170. (d) 32
171. (d) 8
172. (b) 10
173. (d) 3.0
174. (d) 24
175. (b) 2.92
176. (a) 1.05
177. (c) 10
178. (c) 0.725
179. (b) 2
180. (a) np
181. (b) npq
182. (d)  $\sqrt{npq}$
183. (c)  $\frac{q}{np}$
184. (c)  $np > 0$
185. (a)  $Mean > Variance$
186. (c)  $n \rightarrow \infty$  and  $p \rightarrow 0$
187. (a)  $16, \frac{1}{4}$
188. (c) 0.99
189. (b) i and iii
190. (c) Mean is greater than variance
191. (a)  $\frac{(q-p)^2}{np}$
192. (c)  $p < q$
193. (a) 6.25
194. (b) 0.0069
195. (c) 0.3828
196. (c) 0.1419
197. (a) 0.2734
198. (c) 0.1032
199. (b) 0.2508
200. (b) 10
201. (c) 12
202. (c) 8
203. (d) 15
204. (b) 9
205. (a) i and ii
206. (b) i and iii
207. (d) i, ii and iii
208. (d) i, ii and iii
209. (a) 1
210. (b)  $m$
211. (c)  $Mean = Variance$
212. (c)  $m$
213. (c)  $\sqrt{m}$
214. (c)  $m > 0$
215. (b) 5
216. (a)  $n \rightarrow \infty, p \rightarrow 0$  &  $np$  is finite
217. (d) 2
218. (b) 5
219. (b) 3
220. (b) 3.46
221. (a) 4.5
222. (c) 2.45

223. (a) 1.978
224. (c) 0.15
225. (c) 4
226. (c)  $a^{\frac{1}{2}}$
227. (b) 9
228. (a) 5
229. (a) 0.1465
230. (b) 0.1057
231. (c) 2.65
232. (b) 1.2515
233. (b) 0.1954
234. (a) 3
235. (d) 0.0024
236. (b)  $\sqrt{10}$
237. (b) 8
238. (b) i and iii
239. (d) i, ii and iii
240. (b) i and iii
241. (d) i, ii and iii
242. (d) i, ii and iii
243. (a) 0.036
244. (a) Dependency ratio
245. (b) The ratio of the combined non-working (0-14 and 65+) population to the population
246. (b) 0.48
247. (c) 26,000
248. (b) 4 people/km<sup>2</sup>
249. (b) Delta
250. (b) 50 per 1,000 women
251. (d) 62.5 per 1,000 women
252. (b) 16 per 1,000
253. (d)  $\frac{P}{A}$
254. (b) 25.54%
255. (b)  $\frac{B}{P} \times 1000$
256. (c) iii
257. (b) Population Density
258. (b)  $GFR = \frac{B}{F_{15-49}} \times 1000$
259. (c) CBR
260. (a) Arithmetic growth
261. (b) 0.1
262. (b)  $\frac{\log_e 2}{r}$
263. (b)  $\frac{\log_e 2}{r}$
264. (b)  $\frac{\log_e 3}{r}$
265. (d) i, ii and iii