

Statistics MCQ Question Bank

Second Paper

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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. Which of the following are disjoint events?
(a) $A = \{1, 2, 3\}, B = \{4, 5\}$ (b) $A = \{a, b\}, B = \{b, c\}$
(c) $A = \{0\}, B = \{0, 1\}$ (d) $A = \{x, y\}, B = \{x, y\}$
22. Which of the following are disjoint events?
(a) $P = \{1, 2\}, Q = \{2, 3\}$ (b) $P = \{x\}, Q = \{x, y\}$
(c) $P = \{1, 3\}, Q = \{3, 5\}$ (d) $P = \{m, n\}, Q = \{p, q\}$
23. Let the sample space be $S = \{1, 2, 3, \dots, 10\}$. Which of the following pairs of events are disjoint?
i. A: Number is prime, B: Number is greater than 3
ii. A: Number is even, B: Number is divisible by 3
iii. A: Number is less than 5, B: Number is greater than 6
Which one is correct?
(a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
24. Let $S = \{1, 2, \dots, 10\}$. Which of the following event pairs are disjoint?
i. A: Number is divisible by 2, B: Number is divisible by 5
ii. A: Number is less than 7, B: Number is odd
iii. A: Number is a prime, B: Number is a multiple of 4
Which one is correct?
(a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii

25. Let the sample space be $S = \{1, 2, 3, \dots, 10\}$. Which of the following pairs of events are disjoint?

- i. A : Number is a multiple of 4, B : Number is odd
- ii. A : Number is less than 4, B : Number is greater than 8
- iii. A : Number is a square, B : Number is even

Which one is correct?

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

26. Let $S = \{1, 2, 3, \dots, 10\}$. Which of the following pairs of events are disjoint?

- (a) A : Multiples of 3, B : Multiples of 5
- (b) A : Prime numbers, B : Even numbers greater than 2
- (c) A : Numbers less than 4, B : Numbers greater than 6
- (d) None of the above

1.3 Numbers

27. A number is randomly chosen from a list of 10 consecutive positive integers. What is the probability that the number selected is greater than the average (arithmetic mean) of all 10 integers?

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

28. 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

29. 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

30. 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

31. 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

32. 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

1.4 Coin-Die

33. Tossing a die r times generates how many outcomes?

- (a) $6 \times r$
- (b) r^6
- (c) 6^r
- (d) 2^r

34. Tossing a coin r times generates how many outcomes?

- (a) $2 \times r$
- (b) r^2
- (c) 2^r
- (d) 6^r

35. A coin is thrown thrice. How many outcomes are generated?
 (a) 3 (b) 4 (c) 8 (d) 9
36. 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) $\frac{2}{4}$
37. 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) $\frac{1}{3}$
38. 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) $\frac{1}{3}$
39. 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) $\frac{2}{4}$
40. 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) $\frac{1}{4}$
41. 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) $\frac{2}{4}$
42. 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) $\frac{1}{3}$
43. A die is thrown twice. This is called –
 (a) An experiment (b) sample space (c) A random experiment (d) A trial
44. 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) $\frac{3}{6}$
45. Tossing a coin twice generates how many outcomes?
 (a) 4 (b) 16 (c) 8 (d) 2
46. A die is rolled twice. How many possible outcomes are there?
 (a) 6 (b) 12 (c) 36 (d) 18

1.5 Balls-Cards

47. 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) $\frac{3}{11}$
48. 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) $\frac{5}{22}$
49. 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) $\frac{1}{4}$

50. 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) $\frac{1}{3}$

51. 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) $\frac{72}{91}$

52. 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.

53. What is the probability that the card is a King?

- (a) 0.0192 (b) 0.25 (c) 0.5 (d) 0.0769

54. $P(\text{The card is not from Diamonds})$ –

- (a) $\frac{1}{2}$ (b) 0 (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

55. $P(\text{The card is red or Clubs})$

- (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.

56. What is the probability that the ball drawn is red?

- (a) 0.26 (b) 0.25 (c) 0.2 (d) 0.4

57. $P(\text{The ball drawn is not blue})$ –

- (a) $\frac{13}{20}$ (b) 0.5 (c) $\frac{7}{20}$ (d) $\frac{8}{20}$

1.6 Set-Problems

58. The probability of rain is $\frac{1}{6}$ for any given day next week. What is the probability that it will rain on both Monday and Tuesday?

- (a) $\frac{1}{6}$ (b) $\frac{1}{36}$ (c) $\frac{5}{6}$ (d) $\frac{1}{17}$

59. 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 $P(B) = 0.3$

60. 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

61. 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

62. 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

63. 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

64. 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 $P(B) = 0.4$

65. $P(A \cap B) = ?$
- (a) 0.1 (b) 0.3 (c) 0.6 (d) 1

66. 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

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

67. $P(A \cap B) = ?$
- (a) $\frac{5}{12}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{15}{16}$

68. $P(A \cap \bar{B}) = ?$
- (a) $\frac{1}{4}$ (b) $\frac{3}{4}$ (c) $\frac{5}{6}$ (d) $\frac{1}{12}$

69. 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 $P(C) = \frac{2}{5}$, $P(D) = \frac{3}{4}$ & $P(C \cup D) = \frac{9}{10}$

70. $P(C \cap D) = ?$
- (a) $\frac{1}{10}$ (b) $\frac{1}{4}$ (c) $\frac{7}{20}$ (d) $\frac{4}{5}$

71. $P(C \cap \bar{D}) = ?$
- (a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{2}{20}$ (d) $\frac{3}{10}$

72. 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** $P(E) = \frac{1}{4}$, $P(F) = \frac{3}{5}$ & $P(E \cup F) = \frac{11}{20}$

73. $P(E \cap F) = ?$
- (a) $\frac{1}{10}$ (b) $\frac{3}{20}$ (c) $\frac{7}{20}$ (d) $\frac{1}{4}$

74. $P(E \cap \bar{F}) = ?$
- (a) $\frac{1}{10}$ (b) $\frac{1}{5}$ (c) $\frac{3}{10}$ (d) $\frac{1}{20}$

75. 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) $\frac{9}{10}$

76. An urn 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

77. 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
78. 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
79. How many conditions does a probability density function have?
- (a) 2 (b) 3 (c) 4 (d) 5
80. 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
81. A die is thrown thrice and the number of times a 6 appears is denoted by X . How many possible values can X take?
- (a) 1 (b) 2 (c) 3 (d) 4
82. 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) $P(x \geq 1)$
83. Which one is NOT an example of a continuous random variable —
- (a) Weight (b) Height (c) Time (d) Size of television
84. 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) $\frac{5}{4}x^5$
85. 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
86. 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

87. 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

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

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

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

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

90. How many types of random variables are there?

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

91. 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

92. 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) $\int_x P(X)dx \leq 1$

93. 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

94. 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

95. 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

96. 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

97. 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

98. 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) $0 \leq P(X_i, Y_j) \leq 1$

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

2.2 Situation Set

Answer the next two questions based on the following information

99. What is $F(1)$

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

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

- (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	$\frac{1}{3}$	$\frac{1}{6}$

101. What is the value of m?

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

102. Find $F(2)$.

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

103. 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	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{3}$

104. What is the value of c?

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

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

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

106. 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	$\frac{1}{6}$

107. What is the value of a?

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

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

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

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

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

Answer the next two questions based on the following information

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

110. What is $F(2)$?

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

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

- (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

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

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

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

113. $P(X > 0)$

- (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

114. What is the value of k?

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

115. 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

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

116. What is the value of k?

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

117. $F(2) = -$

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

118. $P(x)$ is a -

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

119. 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

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

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

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

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

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

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

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

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

Answer the next two questions based on the following information:

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

124. $P(x) = ?$

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

125. $P(y) = ?$

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

126. 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)	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

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

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

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

- (a) $\frac{5}{6}$
- (b) 0
- (c) 1
- (d) Can't be found from this information

2.3 Multiple Completion

129. For a continuous random variable X with PDF $f(x) = 2x$, defined on $[0, 1]$:

- i. $f(x) \geq 0$ for all $x \in [0, 1]$
- ii. $\int_0^1 f(x) dx = 1$
- iii. $P(X > 1) = 0$

Which one is correct?

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

130. For a continuous random variable X with PDF $f(x) = k(2 - x)$ defined on $0 \leq x \leq 2$:

- i. The value of k is 1.
- ii. The cumulative distribution function $F(x) = x - \frac{x^2}{4}$ for $0 \leq x \leq 2$.
- iii. $P(1 < X < 2) = \frac{3}{8}$

Which one is correct?

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

3 Mathematical Expectation

131. $E(X+Y) = ?$
(a) $E(X) - E(Y)$ (b) $E(X) + E(Y)$ (c) $2E(X) - E(Y)$ (d) $E(X) \times E(Y)$
132. $E(4x+2Y) = ?$
(a) $E(X) - E(Y)$ (b) $4E(X) + 2E(Y)$ (c) $2E(X) + 4E(Y)$ (d) $E(X) \times E(Y)$
133. 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
134. What is the minimum value of variance a random variable?
(a) $-\infty$ (b) 1 (c) 0 (d) -1
135. If $y = ax + b$, what is the value of $V(y)$?
(a) $aV(X)$ (b) $a^2V(X)$ (c) $V(X)$ (d) a^2
136. If $y = ax + b$, what is the value of $E(y)$?
(a) $aE(X) + b$ (b) $a^2E(X)$ (c) $E(X)$ (d) b
137. What is the value of $V(5)$?
(a) 0 (b) 25 (c) 5 (d) 1
138. 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) $n+1$
139. 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
140. Expected value of a constant a is –
(a) 1 (b) Variance (c) a (d) $a+1$
141. The variance of a constant m is –
(a) 0 (b) 1 (c) m (d) m^2
142. 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) $V(X) + V(Y) + 2Cov(X, Y)$
143. What is the value of $V(2X+5)$?
(a) $4V(X) - 5$ (b) 20 (c) $4V(X)$ (d) 0
144. 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
145. Expectation measures –
(a) Dispersion (b) Skewness (c) Kurtosis (d) Central tendency
146. If $E(X) = -0.5$, then $E(1 - 2X) = ?$
(a) 0 (b) -1 (c) 2 (d) 1

147. If $P(X) = \frac{1}{10}; x = 1, 2, \dots, 10$, then $E(X) = ?$
 (a) 10 (b) 5.5 (c) 0 (d) 11
148. 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) $V(X + Y) = V(X) - V(Y) + 2Cov(X, Y)$
149. 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
150. If $E(X) = 2, E(X^2) = 8, V(X) = --$
 (a) 0 (b) 2 (c) 4 (d) 8
151. If $E(X) = 3, E(X^2) = 11, V(X) = --$
 (a) 2 (b) 5 (c) 6 (d) 4
152. If $E(X) = 4$, what is $E(3X - 2)$?
 (a) 10 (b) 8 (c) 7 (d) 6
153. If $E(X) = 5, E(X^2) = 30, V(X) = --$
 (a) 3 (b) 5 (c) 4 (d) 6
154. If $E(X) = 6$, what is $E(\frac{X}{2} + 1)$?
 (a) 4 (b) 3 (c) 2 (d) 5
155. If $E(X) = 2, E(X^2) = 10, V(X) = --$
 (a) 5 (b) 6 (c) 7 (d) 4
156. If $E(X) = 7$, what is $E(4X + 3)$?
 (a) 28 (b) 30 (c) 31 (d) 29
157. If $E(X) = 3$, what is $E(5 - X)$?
 (a) 2 (b) 3 (c) 4 (d) 5
158. If $E(X) = 4$ and $V(X) = 5$, what is $E(X^2)$?
 (a) 9 (b) 16 (c) 21 (d) 25
159. If $E(X) = 3$ and $V(X) = 7$, what is $E(X^2)$?
 (a) 9 (b) 10 (c) 16 (d) 18
160. If $E(X) = 5$ and $E(X^2) = 34$, what is $V(X)$?
 (a) 6 (b) 9 (c) 10 (d) 7
161. If $E(X) = 2$ and $E(X^2) = 14$, what is $V(X)$?
 (a) 10 (b) 9 (c) 8 (d) 7
162. If $E(X) = 6$ and $V(X) = 12$, what is $E(X^2)$?
 (a) 36 (b) 40 (c) 48 (d) 50

163. 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
164. 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
165. 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
166. If the variance of X is 3, what is the variance of $V(3)$?
 (a) 1 (b) 2 (c) 3 (d) 0
167. If $V(X) = 5$, what is $V(X + 5)$?
 (a) 0 (b) 5 (c) 10 (d) 25
168. If $V(X) = 5$, what is $V(2X + 5)$?
 (a) 20 (b) 5 (c) 10 (d) 25
169. If $E(X) = 2$ and $E(X^2) = 8$, then the value of the $V(X) =$?
 (a) 0 (b) 2 (c) 4 (d) 8
170. If $E(X^2) = 20$ and $V(X) = 11$, what is $E(X)$?
 (a) 3 (b) 4 (c) 5 (d) 6
171. If $E(X^2) = 50$ and $V(X) = 14$, what is $E(X)$?
 (a) 5 (b) 6 (c) 7 (d) 8
172. If $E(X^2) = 25$ and $V(X) = 9$, what is $E(X)$?
 (a) 2 (b) 3 (c) 4 (d) 5
173. 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) $7\sqrt{2}$
174. If $E(X^2) = 13$ and $V(X) = 4$, what is $E(X)$?
 (a) 2 (b) 3 (c) 4 (d) 5
175. If $E(X) = 3$, what is $E(2X - 5)$?
 (a) 1 (b) 3 (c) 5 (d) 7
176. If $E(X) = 4$, what is $E(\frac{X}{2} + 3)$?
 (a) 4 (b) 5 (c) 6 (d) 7
177. If $E(X) = -2$, what is $E(3X + 7)$?
 (a) 1 (b) -1 (c) -2 (d) 4
178. If $E(X) = 6$, what is $E(5 - X)$?
 (a) 1 (b) 0 (c) -1 (d) 2
179. If $E(X) = 10$, what is $E(4X - 8)$?
 (a) 12 (b) 40 (c) 28 (d) 32

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

180. 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 THREE questions based on the following information

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

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

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

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

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

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

Answer the next THREE questions based on the following information

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

184. What is the value of $E(X)$?

- (a) 2.00 (b) 2.17 (c) 2.33 (d) 2.50

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

- (a) 4.67 (b) 4.83 (c) 5.00 (d) 5.33

186. What is $V(3X)$?

- (a) 9.67 (b) 11.33 (c) 12.67 (d) 13.50

Answer the next two questions based on the following information

The probability function of random variable x is given below:

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

187. What is the value of k ?

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

188. 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:

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

189. What is the value of k ?

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

190. What is $E(X)$?

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

191. 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

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

192. What is the value of k ?

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

193. What is $E(X)$?

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

4 Binomial Distribution

194. How many parameters are there in a binomial distribution?

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

195. What is the Mean of Binomial Distribution?

- (a) np (b) npq (c) nq (d) \sqrt{npq}

196. What is the Variance of Binomial Distribution?

- (a) np (b) npq (c) nq (d) \sqrt{npq}

197. What is the Standard Deviation of Binomial Distribution?

- (a) np (b) npq (c) nq (d) \sqrt{npq}

198. What is the Coefficient of Variation of Binomial Distribution?

- (a) np (b) npq (c) $\frac{q}{np}$ (d) \sqrt{npq}

199. Which is true of mean (np) of Binomial Distribution?

- (a) $np = 0$ (b) $np < 0$ (c) $np > 0$ (d) $np \neq 0$

200. In a Binomial distribution, how are mean and variance related?

- (a) $Mean > Variance$ (b) $Mean < Variance$
(c) $Mean = Variance$ (d) $Mean = 2 \times Variance$

201. 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 $\sqrt{3}$.

202. 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, $\frac{1}{4}$

203. What is $P(X \neq 0)$?

- (a) 0 (b) 0.01 (c) 0.99 (d) 1

204. **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

205. **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

206. **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) $\frac{(q+p)^2}{npq}$

207. **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, $P(x = 4) = \frac{1}{2}P(x = 5); n = 10$

208. **What is the mean?**

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

209. $P(x = 2) = \text{—}$

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

210. **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

211. **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

212. **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

213. **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

214. **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

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

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

216. **In a binomial distribution with $p = 0.4$ and $P(x) = 0.1419$, what is n ?**

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

217. **In a binomial distribution with $p = 0.5$ and $P(2) = 0.1093$, what is n ?**

- (a) 15 (b) 1 (c) 8 (d) 12

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

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

219. **In a binomial distribution with $p = 0.6$ and $P(5) = 0.02449, n = ?$**

- (a) 3 (b) 9 (c) 10 (d) 15

4.1 Multiple Completion

220. 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

221. 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

222. 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

223. 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

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

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

225. What is the mean of Poisson distribution

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

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

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

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

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

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

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

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

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

230. The parameter of a Poisson Distribution is 5. What is its mean?
 (a) 2 (b) 5 (c) 2.24 (d) 25
231. 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
232. The parameter of a Poisson variate is 2. What is its variance?
 (a) 0 (b) 4 (c) $\sqrt{2}$ (d) 2
233. The parameter of a Poisson variate is 5. What is its variance?
 (a) 10 (b) 5 (c) $\sqrt{5}$ (d) 25
234. A Poisson distribution has a mean of 3. What is the variance?
 (a) 9 (b) 3 (c) $\sqrt{3}$ (d) 0
235. 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
236. 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
237. 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 $P(2) = P(5)$.
238. What is standard deviation?
 (a) 1.978 (b) 1.998 (c) 1.989 (d) 1.889
239. What is the value of $P(2)$?
 (a) 0.25 (b) 0.14 (c) 0.15 (d) 0.02
240. The standard deviation of a poisson distribution is 2. What is the parameter?
 (a) 2 (b) 3 (c) 4 (d) 5
241. Mean of a Poisson variate is a. What is its standard deviation?
 (a) 0 (b) a (c) $a^{\frac{1}{2}}$ (d) a^2
242. The standard deviation of a Poisson distribution is 3. What is the parameter?
 (a) 6 (b) 9 (c) 3 (d) 4
243. For a Poisson distribution with a mean of 5, what is the variance?
 (a) 5 (b) 10 (c) 25 (d) 15
244. 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
245. 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

246. 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
247. If $P(2)$ in a Poisson distribution with parameter λ equals 0.2240, what is the parameter λ ?
 (a) 2.4551 (b) 1.2515 (c) 1.2115 (d) 2.5112
248. A Poisson distribution has a mean of 4. What is $P(3)$?
 (a) 0.1465 (b) 0.1954 (c) 0.1839 (d) 0.2381
249. If the variance of a Poisson distribution is 3, what is the mean?
 (a) 3 (b) $\sqrt{3}$ (c) 2 (d) 6
250. 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
251. The mean of a Poisson distribution is 10. What is its standard deviation?
 (a) 5 (b) $\sqrt{10}$ (c) 10 (d) $\sqrt{20}$
252. 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

253. 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
254. 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
255. 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
256. 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

257. 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

258. 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 house will be burnt?

- (a) 0.036 (b) 0.040 (c) 0.027 (d) 0.091

6 Vital Statistics

259. What is called the ratio of the dependent population to the earning population?

- (a) Dependency ratio (b) Sex ration (c) Population density (d) Growth rate

260. 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)

261. 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

262. 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 ²)
Gamma	1200	400
Delta	800	320

263. What is the population density of City Delta?

- (a) 2 people/km² (b) 4 people/km² (c) 2.5 people/km² (d) 2.2 people/km²

264. 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.

265. 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

266. 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

267. 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

268. 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) $\frac{P}{A}$

269. 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%

270. Crude Birth Rate (CBR) is:

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

271. Which one is a measure of reproduction?

- i) CBR
ii) CDR
iii) NRR

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

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

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

273. 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) $GFR = \frac{G_i}{F_{15-49}} \times 1000$

274. 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

275. Which type of growth is seen here?

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

276. What is the rate of increase?

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

277. 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) $\frac{\log_e 3}{r}$

278. 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) $\frac{\log_e 3}{r}$

279. 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

280. 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) $P(A_1UA_2U \cdots UA_n) = \sum_{i=1}^{\infty} P(A_i|A) \frac{1}{4}$
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. (a) $A = \{1, 2, 3\}, B = \{4, 5\}$
22. (d) $P = \{m, n\}, Q = \{p, q\}$
23. (c) ii and iii
24. (a) i and iii
25. (a) i and ii
26. (d) None of the above
27. (d) $\frac{1}{2}$
28. (c) 0.90
29. (b) 0.85
30. (b) 0.92
31. (c) 0.88
32. (c) 0.975
33. (c) 6^r
34. (c) 2^r
35. (c) 8
36. (a) $\frac{1}{4}$
37. (c) $\frac{3}{4}$
38. (b) $\frac{1}{2}$
39. (a) $\frac{1}{4}$
40. (c) $\frac{3}{4}$
41. (c) $\frac{1}{4}$
42. (a) $\frac{3}{4}$
43. (a) An experiment
44. (b) $\frac{0}{6}$
45. (a) 4
46. (c) 36
47. (b) $\frac{1}{22}$
48. (b) $\frac{6}{11}$
49. (b) $\frac{1}{3}$
50. (b) $\frac{5}{12}$
51. (c) $\frac{48}{91}$
52. (d) $\frac{5}{11}$
53. (d) 0.0769
54. (c) $\frac{3}{4}$
55. (d) $\frac{3}{4}$
56. (a) 0.26
57. (a) $\frac{13}{20}$
58. (a) $\frac{1}{6}$
59. (a) $P(A) = 0.5$ and $P(B) = 0.4$
60. (a) 0.2
61. (b) 0.4
62. (c) 0.7
63. (d) 0.1
64. (c) 0.7
65. (a) 0.1
66. (c) ii and iii
67. (c) $\frac{1}{4}$
68. (a) $\frac{1}{4}$
69. (d) $\frac{11}{12}$
70. (b) $\frac{1}{4}$
71. (c) $\frac{2}{20}$

72. (a) $\frac{17}{20}$
73. (b) $\frac{3}{20}$
74. (a) $\frac{1}{10}$
75. (d) $\frac{9}{10}$
76. (a) $\frac{3}{7}$
77. (d) Page size in word processing softwares
78. (a) Probability distribution
79. (b) 3
80. (d) 3
81. (d) 4
82. (c) $\int_x f(x) dx = 1$
83. (d) Size of television
84. (b) $\frac{1}{20}x^5 + c$
85. (b) i and iii
86. (d) i, ii, and iii
87. (d) i, ii, and iii
88. (d) 1
89. (c) 0
90. (a) 2
91. (b) Weight
92. (c) $\Sigma P(x_i) = 1$
93. (d) Released version number of software
94. (b) Weight of a package
95. (c) Number of floors in a building
96. (c) Number of defective items in 1200
97. (b) Height of students
98. (d) $0 \leq P(X_i, Y_j) \leq 1$
99. (b) 0.75
100. (a) 0.75
101. (c) $\frac{1}{4}$
102. (c) $\frac{5}{6}$
103. (a) $\frac{1}{2}$
104. (c) $\frac{1}{20}$
105. (a) $\frac{5}{12}$
106. (c) $\frac{1}{2}$
107. (c) $\frac{1}{2}$
108. (d) $\frac{1}{6}$
109. (a) $\frac{5}{6}$
110. (b) $\frac{5}{6}$
111. (c) $\frac{1}{2}$
112. (d) $\frac{1}{5}$
113. (c) 1
114. (c) $\frac{1}{21}$
115. (b) Discrete random
116. (c) 14
117. (c) $\frac{5}{14}$
118. (c) Probability mass function
119. (a) i and ii
120. (d) 1
121. (c) 1
122. (d) 1
123. (c) 1
124. (a) $P(x) = \frac{2x+3}{21}$
125. (c) $\frac{3y+2}{7}$
126. (a) i
127. (b) $\frac{1}{6}$
128. (a) $\frac{5}{6}$
129. (d) i, ii and iii
130. (c) ii
131. (b) $E(X) + E(Y)$
132. (b) $4E(X) + 2E(Y)$
133. (c) Variance
134. (c) 0
135. (b) $a^2V(X)$
136. (a) $aE(X) + b$
137. (a) 0
138. (c) $\frac{n+1}{2}$
139. (c) 16
140. (c) a
141. (a) 0
142. (c) $V(X) - V(Y)$
143. (c) $4V(X)$
144. (a) 1
145. (d) Central tendency
146. (c) 2

147. (b) 5.5
148. (b) $V(X + Y) = V(X) + V(Y)$
149. (b) i
150. (c) 4
151. (a) 2
152. (a) 10
153. (b) 5
154. (a) 4
155. (b) 6
156. (c) 31
157. (a) 2
158. (c) 21
159. (c) 16
160. (b) 9
161. (a) 10
162. (c) 48
163. (d) 5
164. (d) 36
165. (b) 9
166. (d) 0
167. (b) 5
168. (a) 20
169. (c) 4
170. (a) 3
171. (b) 6
172. (c) 4
173. (b) $2\sqrt{6}$
174. (c) 4
175. (a) 1
176. (b) 5
177. (a) 1
178. (c) -1
179. (d) 32
180. (d) 8
181. (b) $\frac{13}{12}$
182. (b) $\frac{13}{12}$
183. (d) 2.97
184. (c) 2.33
185. (a) 4.67
186. (b) 11.33
187. (b) 10
188. (d) 3.0
189. (d) 24
190. (b) 2.92
191. (a) 1.05
192. (c) 10
193. (c) 0.725
194. (b) 2
195. (a) np
196. (b) npq
197. (d) \sqrt{npq}
198. (c) $\frac{q}{np}$
199. (c) $np > 0$
200. (a) *Mean > Variance*
201. (c) $n \rightarrow \infty$ and $p \rightarrow 0$
202. (a) $16, \frac{1}{4}$
203. (c) 0.99
204. (b) i and iii
205. (c) Mean is greater than variance
206. (a) $\frac{(q-p)^2}{np}$
207. (c) $p < q$
208. (a) 6.25
209. (b) 0.0069
210. (c) 0.3828
211. (c) 0.1419
212. (a) 0.2734
213. (c) 0.1032
214. (b) 0.2508
215. (b) 10
216. (c) 12
217. (c) 8
218. (d) 15
219. (b) 9
220. (a) i and ii
221. (b) i and iii
222. (d) i, ii and iii
223. (d) i, ii and iii

224. (a) 1
225. (b) m
226. (c) $Mean = Variance$
227. (c) m
228. (c) \sqrt{m}
229. (c) $m > 0$
230. (b) 5
231. (a) $n \rightarrow \infty, p \rightarrow 0$ & np is finite
232. (d) 2
233. (b) 5
234. (b) 3
235. (b) 3.46
236. (a) 4.5
237. (c) 2.45
238. (a) 1.978
239. (c) 0.15
240. (c) 4
241. (c) $a^{\frac{1}{2}}$
242. (b) 9
243. (a) 5
244. (a) 0.1465
245. (b) 0.1057
246. (c) 2.65
247. (b) 1.2515
248. (b) 0.1954
249. (a) 3
250. (d) 0.0024
251. (b) $\sqrt{10}$
252. (b) 8
253. (b) i and iii
254. (d) i, ii and iii
255. (b) i and iii
256. (d) i, ii and iii
257. (d) i, ii and iii
258. (a) 0.036
259. (a) Dependency ratio
260. (b) The ratio of the combined non-working (0-14 and 65+) population to the population
261. (b) 0.48
262. (c) 26,000
263. (b) 4 people/km²
264. (b) Delta
265. (b) 50 per 1,000 women
266. (d) 62.5 per 1,000 women
267. (b) 16 per 1,000
268. (d) $\frac{P}{A}$
269. (b) 25.54%
270. (b) $\frac{B}{P} \times 1000$
271. (c) iii
272. (b) Population Density
273. (b) $GFR = \frac{B}{F_{15-49}} \times 1000$
274. (c) CBR
275. (a) Arithmetic growth
276. (b) 0.1
277. (b) $\frac{\log_e 2}{r}$
278. (b) $\frac{\log_e 2}{r}$
279. (b) $\frac{\log_e 3}{r}$
280. (d) i, ii and iii