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

4. $^n C_r =$
   (a) $\dfrac{n!}{(n-1)!(n+r)!}$ (b) $\dfrac{r!}{n!(n-r)!}$ (c) $\dfrac{n!(n-1)!}{r!}$ (d) $\dfrac{n!}{(r-n)!}$

1.2 Conceptual Questions

5. **The probability of two disjoint sets happening together is:**
   (a) 0.5   (b) 0   (c) 1   (d) $0 \le x < 1$

6. **How many additive laws of probability are there?**
   (a) 1   (b) 2   (c) 3   (d) 4

7. $P(A \cup B) = P(A) + P(B)$ **implies A & B are –**
   (a) Disjoint   (b) Independent   (c) Joint   (d) Independent

8. **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) $P = \lim_{n(S) \to \infty} \frac{n(A)}{n(S)}$ (d) $P = \lim_{n(A) \to \infty} \frac{n(A)}{n(S)}$

9. **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) $P = \lim_{n(S) \to \infty} \dfrac{n(A)}{n(S)}$ (d) $P = \lim_{n(A) \to \infty} \dfrac{n(A)}{n(S)}$

10. **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) $P(A|B) = \frac{P(B|A)}{P(B|A)}$

11. **The third axiom of probability is –**
    (a) $0 \le P(A) \le 1$ (b) $P(S) = 1$

    (c) $P(A_1 U A_2 U \cdots U A_n) = \sum_{i=1}^{\infty} P(A_i)$ (d) $P(A) = 1 - P(A)$

12. **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

13. **An act repeated under some specific conditions is called –**

(a) Event   (b) Experiment   (c) Sample   (d) Sample space

14. $P(0)$ **implies –**

(a) A certain event   (b) An uncertain event   (c) An impossible event (d) A probable event

15. **Events having some common elements are called –**

(a) Complementary events   (b) Mutually exclusive events

(c) Exhaustive events   (d) Non-Mutually exclusive events events

16. **The minimum value of probability is**

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

17. **Each element of sample space is called–**

(a) Trial   (b) Experiment   (c) Variable   (d) Sample Point

18. **Two events not ocurring together are called–**

(a) dependent Events   (b) Independent Events

(c) Mutually Exclusive Events   (d) Marginal Events

19. **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) $P(A \cap \bar{B}) = P(A) \cdot P(B)$

20. **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

1.3   Coin-Die

21. **A coin is thrown thrice. How many outcomes are generated?**

(a) 3   (b) 4   (c) 8   (d) 9

22. **A die is thrown twice. This is called –**

(a) An experiment   (b) sample space   (c) A random experi-(d) A trial
                                                   ment

23. **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) $\frac{3}{6}$

24. **Tossing a coin twice generates how many outcomes?**

(a) 4   (b) 16   (c) 8   (d) 2

25. **A die is rolled twice. How many possible outcomes are there?**

(a) 6   (b) 12   (c) 36   (d) 18

1.4 Balls-Cards

26. **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) $\frac{3}{11}$

    Answer the next three questions based on the following information.

    A card is drawn from of pack of playing cards.

27. **What is the probability that the card is a King?**

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

28. **P(The card is not from Diamonds)–**

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

29. **P(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.

30. **What is the probability that the ball drawn is red?**

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

31. **P(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

Answer the next two questions based on the following information

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

32. $P(A \cap B) =$?

    (a) 0.1   (b) 0.3   (c) 0.6   (d) 1

33. **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

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

34. $P(A \cap B) =$?

    (a) $\frac{5}{12}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{15}{16}$

35. $P(A \cap \bar{B}) =$?

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

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

37. $P(C \cap D) =$?

    (a) $\frac{1}{10}$ (b) $\frac{1}{4}$ (c) $\frac{7}{20}$ (d) $\frac{4}{5}$

38. $P(C \cap \bar{D}) =$?

    (a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{2}{20}$ (d) $\frac{3}{10}$

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

40. $P(E \cap F) =$?

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

41. $P(E \cap \bar{F}) =$?

    (a) $\frac{1}{10}$ (b) $\frac{1}{5}$ (c) $\frac{3}{10}$ (d) $\frac{1}{20}$

42. **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) $\frac{9}{10}$

43. **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

44. **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

45. **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

46. **How many conditions does a probability density function have?**

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

47. **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

    Answer the next two questions based on the following information

$$\begin{array}{c|ccc} X & 0 & 1 & 2 \\ \hline P(x) & \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \end{array}$$

48. **What is F(1)**

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

49. $P(X \leq 1 \leq 3) =-$

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

50. **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) $P(x \geq 1)$

51. **Which one is NOT an example of a continuous random variable –**

    (a) Weight   (b) Height   (c) Time   (d) Size of television

52. **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) $\frac{5}{4}x^5$

53. **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

54. **The conditions for a cumulative distribution function (CDF) are–**

    i. $F(x)$ is non-decreasing.

    ii. $0 \leq F(x) \leq 1$

    iii. $\lim_{x \to \infty} F(x) = 1$

    Which one is correct?

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

55. **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

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

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

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

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

58. **How many types of random variables are there?**

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

59. **Which of the following is not a discrete random variable?**
    (a) umber of students
    (b) Weight
    (c) Number of heads in coin toss
    (d) Population

60. **Which one is a property of a probability distribution?**
    (a) $P(x_i) = 0$
    (b) $P(x_i \neq 1)$
    (c) $\Sigma P(x_i) = 1$
    (d) $\int_x P(X)dx \leq 1$

61. **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

62. **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

63. **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

64. **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

65. **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

66. **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   Misc

Answer the next two questions based on the following information

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

67. **What is the value of $P(2 < x < 3)$**
    (a) $\frac{4}{5}$
    (b) $\frac{3}{5}$
    (c) $\frac{2}{5}$
    (d) $\frac{1}{5}$

68. $P(X > 0)$
    (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

69. **What is the value of k?**
    (a) $\frac{7}{21}$
    (b) $\frac{5}{21}$
    (c) $\frac{1}{21}$
    (d) 1

70. **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

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

71. **What is the value of k?**
    (a) 10   (b) 11   (c) 14   (d) 15

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

73. $P(x)$ **is a** $-$
    (a) Joint probability distribution   (b) Cumulative probability distribution
    (c) Probability mass function   (d) Probability Density function

74. **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

75. $f(x) = 2x; 0 < X < 3$; **What is F(3)?**
    (a) 3   (b) 0   (c) 1   (d) 0

76. $f(x) = 3x; 0 < X < 2$; **What is** $F(2)$**?**
    (a) 6   (b) 3   (c) 1   (d) 0

77. $f(x) = x^2; 0 < X < 4$; **What is** $F(4)$**?**
    (a) 16   (b) 0   (c) 4   (d) 1

78. $f(x) = 4 - x; 1 < X < 5$; **What is** $F(5)$**?**
    (a) 3   (b) 0   (c) 1   (d) 4

Answer the next two questions based on the following information:
$P(x, y) = \frac{1}{21}(x + y); x = 1, 2, 3$ and $y = 1, 2$

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

80. **P(y)=?**
    (a) $\frac{y+2}{7}$ (b) $\frac{y+3}{7}$ (c) $\frac{3y+2}{7}$ (d) $\frac{y+2}{9}$

81. **If** $f(x) = kx^3; -1 \le x \le 1$**, 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)	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

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

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

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

(a) $\frac{5}{6}$ (b) 0

(c) 1   (d) Can't be found from this information

3   Mathematical Expectation

84. **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)	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{5}{12}$

85. **What is the value of $E(X)$**
    (a) $\frac{15}{12}$ (b) $\frac{13}{12}$ (c) $\frac{1}{12}$ (d) $\frac{11}{13}$

86. **What is the value of $E(X^2)$**
    (a) $\frac{25}{12}$ (b) $\frac{13}{12}$ (c) $\frac{23}{12}$ (d) $\frac{25}{13}$

87. **What is $V(2X)$?**
    (a) 2.93   (b) 2.91   (c) 1.97   (d) 2.97

88. **What is the expected value of of the squared deviation of the value of the random variable from their mean?**
    (a) Arithmetic Mean   (b) Expectation   (c) Variance   (d) Co-variance

89. **What is the minimum value of variance a random variable?**
    (a) $-\infty$ (b) 1   (c) 0   (d) -1

90. **If $y = ax + b$, what is the value of $V(y)$?**
    (a) $aV(X)$ (b) $a^2V(X)$ (c) $V(X)$ (d) a^2

91. **If $y = ax + b$, what is the value of $E(y)$?**
    (a) $aE(X) + b$ (b) $a^2E(X)$ (c) $E(X)$ (d) b

92. **What is the value of $V(5)$?**
    (a) 0   (b) 25   (c) 5   (d) 1

93. **If $P(x) = \frac{1}{n}; x = 1, 2, 3, \cdots, n$, what is the value of $E(X)$?**
    (a) $\frac{n}{2}$ (b) $\frac{n-1}{2}$ (c) $\frac{n+1}{2}$ (d) $n + 1$

94. **If $P(x) = \dfrac{4 - |5 - x|}{k}; x = 2, 3, 4, \cdots 8$, what is the value of k?**
    (a) 5   (b) 8   (c) 16   (d) 24

95. **Expected value of a constant a is $-$**
    (a) 1   (b) Variance   (c) a   (d) a+1

96. **The variance of a constant m is $-$**
    (a) 0   (b) 1   (c) m   (d) m^2

97. **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) $V(X) + V(Y) + 2Cov(X, Y)$

98. **What is the value of V(2X+5)?**
    (a) $4V(X) - 5$ (b) 20   (c) $4V(X)$ (d) 0

99. **If $P(x) = \frac{1}{20}; x = 1, 2, 3, \cdots, 20$, what is the standard deviation?**
    (a) 1   (b) 5.77   (c) 7.75   (d) 12.57

100. **Expectation measures –**
    (a) Dispersion   (b) Skewness   (c) Kurtosis   (d) Central tendency

101. **If $E(X) = -0.5$, then $E(1 - 2X) =$?**
    (a) 0   (b) -1   (c) 2   (d) 1

102. **If $P(X) = \frac{1}{10}; x = 1, 2, \cdots 10$, then $E(X) =$?**
    (a) 10   (b) 5.5   (c) 0   (d) 11

103. **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) $V(X + Y) = V(X) - V(Y) + 2Cov(X, Y)$

104. **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

105. **If $E(X) = 2, E(X^2) = 8, V(X) = --$**
    (a) 0   (b) 2   (c) 4   (d) 8

106. **If $P(x) = \frac{4 - |5 - x|}{k}; x = 2, 3, 4, \cdots 8$, what is the value of $E(X)$?**
    (a) 3   (b) 8   (c) 16   (d) 5

107. **If $P(x) = \frac{6 - |7 - x|}{k}; x = 2, 3, 4, \cdots 12$, what is the value of $E(X)$?**
    (a) 6   (b) 9   (c) 13   (d) 36

108. **If $P(x) = \frac{3 - |4 - x|}{k}; x = 2, 3, 4, \cdots 6$, what is the value of k?**
    (a) 6   (b) 9   (c) 10   (d) 40

109. **If the variance of X is 3, what is the variance of V(3)?**
    (a) 1   (b) 2   (c) 3   (d) 0

110. **If $V(X) = 5$,, what is $V(X + 5)$?**
    (a) 0   (b) 5   (c) 10   (d) 25

111. **If $V(X) = 5$,, what is $V(2X + 5)$?**
    (a) 20   (b) 5   (c) 10   (d) 25

112. **If $E(X) = 2$ and $E(X^2) = 8$, then the value of the $V(X) =$?**
    (a) 0   (b) 2   (c) 4   (d) 8

113. **If $P(x) = \dfrac{1}{15}; x = 1, 2, 3, \cdots 15$, 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:
$$P(x) = \frac{x}{k}; x = 1, 2, 3, 4$$

114. **What is the value of k?**
    (a) 6   (b) 10   (c) 15   (d) 20

115. **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:
$$P(x) = \frac{2x+1}{k}; x = 1, 2, 3, 4$$

116. **What is the value of k?**
    (a) 18   (b) 25   (c) 12   (d) 24

117. **What is $E(X)$?**
    (a) 1.75   (b) 2.92   (c) 3.25   (d) 2.25

118. **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
$$P(x) = \frac{x-1}{k}; x = 2, 3, 4, 5$$

119. **What is the value of k?**
    (a) 2   (b) 5   (c) 10   (d) 25

120. **What is $E(X)$?**
    (a) 0.425   (b) 0.525   (c) 0.725   (d) 0.625

4   Binomial Distribution

121. **How many parameters are there in a binomial distribution?**
    (a) 1   (b) 2   (c) 3   (d) 4

122. **What is the Mean of Binomial Distribution?**
    (a) np   (b) npq   (c) nq   (d) $\sqrt{npq}$

123. **What is the Variance of Binomial Distribution?**
    (a) np   (b) npq   (c) nq   (d) $\sqrt{npq}$

124. **What is the Standard Deviation of Binomial Distribution?**
    (a) np   (b) npq   (c) nq   (d) $\sqrt{npq}$

125. **What is the Coefficient of Variation of Binomial Distribution?**
    (a) np   (b) npq   (c) $\frac{q}{np}$ (d) $\sqrt{npq}$

126. **Which is true of mean (np) of Binomial Distribution?**
    (a) $np = 0$ (b) $np < 0$ (c) $np > 0$ (d) $np \neq 0$

127. **In a Binomial distribution, how are mean and variance related?**
    (a) $Mean > Variance$ (b) $Mean < Variance$
    (c) $Mean = Variance$ (d) $Mean = 2 \times Variance$

128. **When does Binomial distribution tend to Poisson distribution?**
    (a) $n \to \infty$ and $p \to \infty$ (b) $n \to 0$ and $p \to 0$ (c) $n \to \infty$ and $p \to 0$ (d) $n \to 0$ and $p \to \infty$

    Answer the next two questions based on the following information.

    X is a binomial variate with expectation 4 and standard deviation $\sqrt{3}$.

129. **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) $10, \frac{1}{4}$

130. **What is $P(X \neq 0)$?**
    (a) 0   (b) 0.01   (c) 0.99   (d) 1

131. **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

132. **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

133. **What is the skewness of binomial distribution?**
    (a) $\dfrac{(q-p)^2}{np}$ (b) $\dfrac{(q-p)^2}{np}$ (c) $\dfrac{(p+1)^2}{npq}$ (d) $\dfrac{(q+p)^2}{npq}$

134. **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

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

135. **What is the mean?**
    (a) 6.25   (b) 5.15   (c) 8.52   (d) 5.22

136. $P(x = 2) = $ —
    (a) 0.0053   (b) 0.0069   (c) 0.0085   (d) 0.94

5 Poisson Distribution

137. **The no. of parameters in a Poisson distribution is —**
    (a) 1 (b) 2 (c) 3 (d) 4

138. **What is the mean of Poisson distribution**
    (a) $\frac{1}{\sqrt{m}}$ (b) m (c) $\frac{1}{m}$ (d) $1 + \frac{1}{m}$

139. **Which relationship between mean and variance of Poisson Distribution is correct?**
    (a) $Mean > Variance$ (b) $Mean < Variance$ (c) $Mean = Variance$ (d) $Mean \neq Variance$

140. **What is the Variance of Poisson Distribution(with parameter m)?**
    (a) $\frac{1}{\sqrt{m}}$ (b) $\frac{1}{m}$ (c) m (d) $\frac{1}{m+1}$

141. **What is the Standard Deviation of Poisson Distribution(with parameter m)?**
    (a) $\frac{1}{\sqrt{m}}$ (b) $\frac{1}{m}$ (c) $\sqrt{m}$ (d) $\frac{1}{m+1}$

142. **Which one is true of the parameter (m) of Poisson Distribution?**
    (a) $m = 0$ (b) $m < 0$ (c) $m > 0$ (d) $m = 1$

143. **The parameter of a Poisson Distribution is 5. What is its mean?**
    (a) 2 (b) 5 (c) 2.24 (d) 25

144. **When does Binomial Distribution tend to Poisson Distribution?**
    (a) $n \to \infty, p \to 0$ & np is finite   (b) $n \to \infty, p \to 0$ & np is infinite
    (c) $n \to \infty, p \to \infty$ & np is finite   (d) $n \to 0, p \to \infty$ & np is infinite

145. **The parameter of a Poisson variate is 2. What is its variance?**
    (a) 0 (b) 4 (c) $\sqrt{2}$ (d) 2

146. **The parameter of a Poisson variate is 5. What is its variance?**
    (a) 10 (b) 5 (c) $\sqrt{5}$ (d) 25

147. **A Poisson distribution has a mean of 3. What is the variance?**
    (a) 9 (b) 3 (c) $\sqrt{3}$ (d) 0

148. **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

149. **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

150. **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).

151. **What is standard deviation?**
    (a) 1.978 (b) 1.998 (c) 1.989 (d) 1.889

152. **What is the value of P(2)?**
    (a) 0.25 (b) 0.14 (c) 0.15 (d) 0.02

153. **The standard deviation of a poisson distribution is 2. What is the parameter?**

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

154. **Mean of a Poisson variate is a. What is its standard deviation?**

    (a) 0   (b) a   (c) $a^{\frac{1}{2}}$ (d) a^2

155. **The standard deviation of a Poisson distribution is 3. What is the parameter?**

    (a) 6   (b) 9   (c) 3   (d) 4

156. **For a Poisson distribution with a mean of 5, what is the variance?**

    (a) 5   (b) 10   (c) 25   (d) 15

157. **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

158. **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

159. **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

160. **A Poisson distribution has a mean of 4. What is $P(3)$?**

    (a) 0.1465   (b) 0.1954   (c) 0.1839   (d) 0.2381

161. **If the variance of a Poisson distribution is 3, what is the mean?**

    (a) 3   (b) $\sqrt{3}$ (c) 2   (d) 6

162. **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

163. **The mean of a Poisson distribution is 10. What is its standard deviation?**

    (a) 5   (b) $\sqrt{10}$ (c) 10   (d) $\sqrt{20}$

164. **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   Problems

165. **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

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

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

167. **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)

168. **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

169. **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

170. **What is the population density of City Delta?**

    (a) 2 people/km^2 (b) 4 people/km^2 (c) 2.5 people/km^2 (d) 2.2 people/km^2

171. **Which city is less densely populated?**

    (a) Gamma   (b) Delta

    (c) Both are equal   (d) Cannot be determined

    Answer the following 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.

172. **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

173. **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

174. **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) $\frac{P}{A}$

175. **In the following data, what is the dependency ratio?**

Age	0-14	15-24	25-34	35-44	45-54	55-64	65+
Populatation	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%

176. **Crude Birth Rate (CBR) is:**

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

177. **Which one is a measure of reproduction?**

    i) CBR
    ii) CDR
    iii) NRR

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

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

    (a) Population Index   (b) Population Density

    (c) Human Development Index   (d) Dependency Ratio

179. **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) $GFR = \frac{G_i}{F15-49} \times 1000$

Answer the next two questions based on the following information

Year	1	2	3	4
Population	100	110	120	130

180. **Which type of growth is seen here?**

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

181. **What is the rate of increase?**

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

Answer Key:

1. (c) 6

2. (b) 6

3. (a) $\dfrac{n!}{(n-r)!}$

4. (a) $\dfrac{n!}{(n-1)!(n+r)!}$

5. (b) 0

6. (b) 2

7. (a) Disjoint

8. (a) $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$

9. (a) $P = \frac{\text{No. of favorable outcomes}}{\text{Total no. of possible outcomes}}$

10. (a) $P(A|B) = \frac{P(A \cap B)}{P(B|A)}$

11. (c) $P(A_1 U A_2 U \cdots U A_n) = \sum_{i=1}^{\infty} P(A_i)$

12. (c) ii and iii

13. (b) Experiment

14. (c) An impossible event

15. (a) Complementary events

16. (c) 0

17. (d) Sample Point

18. (c) Mutually Exclusive Events

19. (a) $P(A \cap B) = P(A) \cdot P(B)$

20. (c) 0.90

21. (c) 8

22. (a) An experiment

23. (b) $\frac{0}{6}$

24. (a) 4

25. (c) 36

26. (b) $\frac{1}{22}$

27. (d) 0.0769

28. (c) $\frac{3}{4}$

29. (d) $\frac{3}{4}$

30. (a) 0.26

31. (a) $\frac{13}{20}$

32. (a) 0.1

33. (c) ii and iii

34. (c) $\frac{1}{4}$

35. (a) $\frac{1}{4}$

36. (d) $\frac{11}{12}$

37. (b) $\frac{1}{4}$

38. (c) $\frac{2}{20}$

39. (a) $\frac{17}{20}$

40. (b) $\frac{3}{20}$

41. (a) $\frac{1}{10}$

42. (d) $\frac{9}{10}$

43. (a) $\frac{3}{7}$

44. (d) Page size in word processing softwares

45. (a) Probability distribution

46. (b) 3

47. (d) 3

48. (b) 0.75

49. (a) 0.75

50. (c) $\int_{x} f(x)\, dx = 1$

51. (d) Size of television

52. (b) $\frac{1}{20}x^5 + c$

53. (b) i and iii

54. (d) i, ii, and iii

55. (d) i, ii, and iii

56. (d) 1

57. (c) 0

58. (a) 2

59. (b) Weight

60. (c) $\Sigma P(x_i) = 1$

61. (d) Released version number of a software

62. (b) Weight of a package

63. (c) Number of floors in a building

64. (c) Number of defective items in a batch

65. (b) Height of students

66. (d) $0 \le P(X_i, Y_j) \le 1$

67. (d) $\frac{1}{5}$

68. (c) 1

69. (c) $\frac{1}{21}$

70. (b) Discrete random

71. (c) 14

72. (c) $\frac{5}{14}$

73. (c) Probability mass function

74. (a) i and ii

75. (c) 1

76. (c) 1

77. (d) 1

78. (c) 1

79. (a) $P(x) = \frac{2x+3}{21}$

80. (c) $\frac{3y+2}{7}$

81. (a) i

82. (b) $\frac{1}{6}$

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

84. (b) E(X) + E(Y)

85. (b) $\frac{13}{12}$

86. (b) $\frac{13}{12}$

87. (d) 2.97

88. (c) Variance

89. (c) 0

90. (b) $a^2 V(X)$

91. (a) $aE(X) + b$

92. (a) 0

93. (c) $\frac{n+1}{2}$

94. (c) 16

95. (c) a

96. (a) 0

97. (c) $V(X) - V(Y)$

98. (c) $4V(X)$

99. (a) 1

100. (d) Central tendency

101. (c) 2

102. (b) 5.5

103. (b) $V(X + Y) = V(X) + V(Y) + 2Cov(X,Y)$

104. (b) i

105. (c) 4

106. (d) 5

107. (d) 36

108. (b) 9

109. (d) 0

110. (b) 5

111. (a) 20

112. (c) 4

113. (d) 8

114. (b) 10

115. (d) 3.0

116. (d) 24

117. (b) 2.92

118. (a) 1.05

119. (c) 10

120. (c) 0.725

121. (b) 2

122. (a) np

123. (b) npq

124. (d) $\sqrt{npq}$

125. (c) $\frac{q}{np}$

126. (c) $np > 0$

127. (a) $Mean > Variance$

128. (c) $n \to \infty$ and $p \to 0$

129. (a) 16, $\frac{1}{4}$

130. (c) 0.99

131. (b) i and iii

132. (c) Mean is greater than variance

133. (a) $\dfrac{(q-p)^2}{np}$

134. (c) p < q

135. (a) 6.25

136. (b) 0.0069

137. (a) 1

138. (b) m

139. (c) $Mean = Variance$

140. (c) m

141. (c) $\sqrt{m}$

142. (c) $m > 0$

143. (b) 5

144. (a) $n \to \infty, p \to 0$ & np is finite

145. (d) 2

146. (b) 5

147. (b) 3

148. (b) 3.46

149. (a) 4.5

150. (c) 2.45

151. (a) 1.978

152. (c) 0.15

153. (c) 4

154. (c) $a^{\frac{1}{2}}$

155. (b) 9

156. (a) 5

157. (a) 0.1465

158. (c) 2.65

159. (b) 1.2515

160. (b) 0.1954

161. (a) 3

162. (d) 0.0024

163. (b) $\sqrt{10}$

164. (b) 8

165. (a) 0.036

166. (a) Dependency ratio

167. (b) The ratio of the combined non-working (0-14 and 65+) population to the population

168. (b) 0.48

169. (c) 26,000

170. (b) 4 people/km^2

171. (b) Delta

172. (b) 50 per 1,000 women

173. (c) 50 per 1,000 women

174. (d) $\frac{P}{A}$

175. (b) 25.54%

176. (b) $\frac{B}{P} \times 1000$

177. (c) iii

178. (b) Population Density

179. (b) $GFR = \frac{B}{F_{15-49}} \times 1000$

180. (a) Arithmetic growth

181. (b) 0.1