QB365 Question Bank Software Study Materials

Probability Distributions 50 Important 1Marks Questions With Answers (Book Back and Creative)

12th Standard

Maths

Total Marks : 50

50 x 1 = 50

1) Let X be random variable with probability density function

$$f(x) = \begin{cases} \frac{2}{x^3} & x \geq 1 \\ 0 & x < 1 \end{cases}$$

Which of the following statement is correct

(a) both mean and variance exist **(b) mean exists but variance does not exist** (c) both mean and variance do not exist

(d) variance exists but Mean does not exist

2) A rod of length $2l$ is broken into two pieces at random. The probability density function of the shorter of the two pieces is

\(f(x)= \begin{cases}\frac{1}{l} & 0

The mean and variance of the shorter of the two pieces are respectively.

(a) $\frac{l}{2}, \frac{l^2}{3}$ (b) $\frac{l}{2}, \frac{l^2}{6}$ (c) $l, \frac{l^2}{12}$ **(d)** $\frac{l}{2}, \frac{l^2}{12}$

3) Consider a game where the player tosses a six-sided fair die. If the face that comes up is 6, the player wins Rs. 36, otherwise he loses Rs. k^2, where k is the face that comes up k = {1, 2, 3, 4, 5}.

The expected amount to win at this game in Rs. is

(a) $\frac{19}{6}$ **(b)** $-\frac{19}{6}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

4) A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is rolled and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is

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

5) A random variable X has binomial distribution with n = 25 and p = 0.8 then standard deviation of X is

(a) 6 (b) 4 (c) 3 **(d) 2**

6) Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are

(a) i + 2n, i = 0,1,2... n **(b) 2i- n, i = 0,1,2... n** (c) n - i, i = 0,1,2... n (d) 2i + 2n, i = 0, 1, 2...n

7) If the function $f(x) = \frac{1}{12}$ for a < x < b, represents a probability density function of a continuous random variable X, then which of the following cannot be the value of a and b?

(a) 0 and 12 (b) 5 and 17 (c) 7 and 19 **(d) 16 and 24**

8) Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus. Then E(X) and E(Y) respectively are

(a) 50,40 (b) 40,50 **(c) 40.75,40** (d) 41,41

9) Two coins are to be flipped. The first coin will land on heads with probability 0.6, the second with probability 0.5. Assume that the results of the flips are independent, and let X equal the total number of heads that result The value of E(X) is

(a) 0.11 **(b) 1.1** (c) 11 (d) 1

10) On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

(a) $\frac{11}{243}$ (b) $\frac{3}{8}$ (c) $\frac{1}{243}$ (d) $\frac{5}{243}$

11) If P(X = 0) = 1 − P(X = 1). If E(X) = 3Var(X), then P(X = 0).

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

12) If X is a binomial random variable with expected value 6 and variance 2.4, then P(X = 5) is

(a) $\binom{10}{5}\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^4$ (b) $\binom{10}{5}\left(\frac{3}{5}\right)^{10}$ (c) $\binom{10}{5}\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^6$ **(d)** $\binom{10}{5}\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^5$

13) The random variable X has the probability density function

$f(x) = \begin{cases} ax+b & 0<x<1 \\ 0 & \text{otherwise} \end{cases}$ and $E(X) = \frac{7}{12}$, then a and b are respectively

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

14) Suppose that X takes on one of the values 0, 1, and 2. If for some constant k,

$P(X=i) = kP(X=i-1)$ for $i = 1, 2$ and $P(X=0) = \frac{1}{7}$, then the value of k is

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

15) Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day

II. The number of customers in a queue to buy train tickets at a moment.

III. The time taken to complete a telephone call.

(a) I and II (b) II only (c) III only (d) II and III

16) If $f(x) = \begin{cases} 2x & 0 \le x \le a \\ 0 & \text{otherwise} \end{cases}$ is a probability density function of a random variable, then the value of a is

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

17) The probability mass function of a random variable is defined as:

x	-2	-1	0	1	2
f(x)	k	2k	3k	4k	5k

Then E(X) is equal to:

(a) $\frac{1}{15}$ (b) $\frac{1}{10}$ (c) $\frac{1}{3}$ **(d)** $\frac{2}{3}$

18) Let X have a Bernoulli distribution with mean 0.4, then the variance of (2X - 3) is

(a) 0.24 (b) 0.48 (c) 0.6 **(d) 0.96**

19) If in 6 trials, X is a binomial variable which follows the relation 9P(X = 4) = P(X = 2), then the probability of success is

(a) 0.125 **(b) 0.25** (c) 0.375 (d) 0.75

20) A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

(a) $\frac{57}{20^3}$ (b) $\frac{57}{20^2}$ (c) $\frac{19^3}{20^3}$ (d) $\frac{57}{20}$

21) If F(x) is the probability distribution function then $F(-\infty)$ is is _____

(a) 1 (b) 2 (c) ∞ **(d) 0**

22) IfF(x) is the probability distribution function, then $F(-\infty)$ is _____

(a) 1 (b) 2 (c) ∞ (d) 0

23) If a random variable X has the p.d.f. $f(x) = \frac{k}{x^2+1}$,0 then k is _____

(a) π (b) $\frac{1}{\pi}$ (c) 1 **(d)** $\frac{2}{\pi}$

24) In a binomial distribution,$n=4, P(X=0)=\frac{16}{81}$,then $P(X=4)$ _____

(a) $\frac{1}{16}$ **(b)** $\frac{1}{81}$ (c) $\frac{1}{27}$ (d) $\frac{1}{8}$

25) A die is tossed 5 times. Getting an odd number is considered a success. Then the variance of distribution of number of success is _____

(a) $\frac{8}{3}$ (b) $\frac{3}{8}$ (c) $\frac{4}{5}$ **(d)** $\frac{5}{4}$

26) If the p.d.f. \(f(x)=\{ \begin{matrix} \cfrac { x }{ 2 } ,0 then $E\left(3x^2-2x\right)$ =_____.

(a) $\frac{2}{3}$ (b) $\frac{4}{3}$ **(c)** $\frac{10}{3}$ (d) $\frac{7}{3}$

27) The variance of a binomial distribution is_____.

(a) equal to its mean **(b) less than its mean** (c) greater than its mean (d) none

28) A coin is tossed 3 times. The probability of getting exactly 2 heads is_____

(a) $\frac{1}{2}$ (b) $\frac{1}{8}$ **(c)** $\frac{3}{8}$ (d) $\frac{1}{4}$

29) The sum of the mean and variance of a binomial distribution for 6 total is 2.16. Then the probability of success p =_____

(a) 0.4 (b) 0.6 (c) 0.8 **(d) 0.2**

30) If the mean and variance of a binomial variate are 2 and 1 respectively, the probability that X takes a value greater than one is equal to_____.

(a) $\frac{5}{16}$ **(b)** $\frac{11}{16}$ (c) $\frac{10}{16}$ (d) $\frac{1}{2}$

31) A die is thrown 10 times. Getting a number greater than 3 is considered a success. The S.D of the number of successes is _____

(a) 2.5 **(b) 1.56** (c) 5 (d) 25

32) If x is a continuous random variable then $P\left(x\geq a\right)=$ _____.

(a) $P(x<a)$ (b) $1-P(x>a)$ **(c)** $P(x>a)$ (d) $1-P(x\leq a-1)$

33) If x is a continuous random variable then P(x ≥ a) = _____

(a) $P(x\ <\ a)$ (b) $P(a\leq x\leq b)$ **(c)** $P\left(x>a\right)$ (d) $1-P\left(x\leq a-1\right)$

34) If X is a continuous random variable then which of the following is incorrect?

(a) F'(x) = f(x) (b) $F(\infty)=1, F(-\infty)=0$ (c) $P(a\leq X\leq b)=F(b)-F(a)$ **(d) \(P(a\le X**

35) If the mean and S.D of a binomial distribution are 12 and 2 respectively, then _____

(a) npq = 4 (b) $q=\frac{1}{3}$ (c) $P=\frac{2}{3}$ **(d)** $pq=\frac{1}{9}$

36) For a Bernouli distribution

(a) $\sigma=\sqrt{npq}$ (b) $mean=\mu$ (c) $\mu=p$ (d) $\sigma^2=pq$

37) The probability mass function of a discrete random variable f(x) is _____

(a) f(x) = 1 (b) f(x) $\geq$ 1 **(c) f(x) $\geq$ 0** (d) f(x) = 0

38) The Cumulative distribution function F(x) of a discrete random variable is _____

(a) A decreasing function (b) An increasing function **(c) A non - decreasing function** (d) A non - increasing function

39) The value of $\lim_{x\to-\infty}F(x)=$ _____

(a) 1 **(b) 0** (c) $-\infty$ (d) ∞

40) The value of $\lim_{x\to+\infty}F(x)=$ _____

(a) 1 (b) 0 (c) $-\infty$ (d) ∞

41) P(a < X < b) = _____

(a) F(b) - F(a) (b) 0 (c) 1 (d) None

42) If X is a discrete random variable then E(X) is _____

(a) $\sum xf(x)$ (b) $xf(x)$ (c) $\int_{-\infty}^{\infty} xf(x)dx$ (d) $x\sum f(x)$

43) If X is a continuous random variable then E(X) is _____

(a) $\int_{-\infty}^{\infty} xf(x)dx$ (b) $\sum xf(x)$ (c) $x\int_{-\infty}^{\infty} f(x)dx$ (d) None

44) The shape of binomial distribution is _____ when P = 0.5 or n is large

(a) Symmetrical (b) Not Symmetrical (c) Parallel (d) None

45) When $p = q = \frac{1}{2}$ then the mean and variance of a binomial distribution are _____

(a) 0, 1 (b) 1, 0 **(c)** $\frac{n}{2}, \frac{n}{4}$ (d) n, n^2

46) If the mean of a binomial distribution is 5 and its variance is 4, then the value of n and p are _____

(a) $\left(\frac{1}{5}, 25\right)$ **(b)** $\left(25, \frac{1}{5}\right)$ (c) $\left(25, \frac{4}{5}\right)$ (d) $\left(\frac{4}{5}, 25\right)$

47) If $f(x) = \begin{cases} 2x & 0 \le x \le a \\ 0 & \text{otherwise} \end{cases}$ is a Probability density function of a random variable, then the value of a is _____

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

48) If the actual value of something is 5 and its approximated value is 4 then absolute error is _____

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

49) In 16 throws of a die getting an even number is considered a success, then the variance of the successes is _____

(a) 4 (b) 2 (c) 6 (d) 256

50) Which one of the following is not true in the case of dicrete random variable X?

(a) 0< = F(x) < = 1, for all x ϵ R (b) $lim_{x\to\infty}F(x) = F(\infty) = 1$ **(c) F(x) is a real valued decreasing function**

(d) $lim_{x\to\infty}F(x) = F(\infty) = 0$