1. The joint cumulative distribution function \( F(x,y) \) lies within the values
   a). -1 and +1       c). \(-\infty\) and 0
   b). -1 and 0        d). 0 and 1
2. If \( x \) and \( y \) are two independent random variables then \( f(x,y) = .... \)
   a). \( f(x)+f(y) \)       c). \( f(x)f(y) \)
   b). \( f(x)-f(y) \)       d). \( f(x)/f(y) \)
3. The value of \( F(-\infty, +\infty) = .... \)
   a). 0       b). 1       c). \(+\infty\)       d). \(-\infty\)
4. If \( X \) and \( Y \) are two independent r.v.’s the cumulative distribution function \( F(x,y) \) is equal to
   a). \( F_1(x)F_2(y) \)
   b). \( P(X \leq x, Y \leq y) \)
   c). both a and b
   d). neither a nor b
5. If \( X \) and \( Y \) are two independent r.v’s then
   a). \( E(XY)=1 \)
   b). \( E(XY)=0 \)
   c). \( E(XY)=E(X)E(Y) \)
   d). \( E(XY) = a \) constant
6. If \( X \) and \( Y \) are two random variables such that their expectations exist and \( P(x \leq y)=1 \) then
   a). \( E(X) \leq E(Y) \)
   b). \( E(X) \geq E(Y) \)
   c). \( E(X)=E(Y) \)
   d). None of the above
7. If \( X \) is a random variable then \( E(X-E(X))^2 = .... \)
   a). \( \mu_1 \)       b). \( \mu_2 \)       c). \( \mu_3 \)       d). \( \mu_4 \)
8. If \( X \) and \( Y \) are two random variables then
   a). \( E(XY)^2 = E(X^2)E(Y^2) \)
   b). \( E(XY)^2 = E(X^2Y^2) \)
   c). \( E(XY)^2 \geq E(X^2)E(Y^2) \)
   d). \( E(XY)^2 \leq E(X^2)E(Y^2) \)
9. If \( X \) and \( Y \) are two random variables then the expression \( E(X-E(X))(Y- E(Y)) \) is called:
   a). \( V(X) \)
   b). \( V(Y) \)
   c). \( \text{Cov}(X,Y) \)
   d). \( \text{Correlation of X and Y} \)
10. If \( X \) is a random variable with mean \( \mu \) then \( E(X-\mu)^r \) is called:
    a). \( \text{variance} \)
    b). \( \text{r}^{th} \text{ raw moment} \)
    c). \( \text{r}^{th} \text{ central moment} \)
    d). none of the above
11. If X is a r.v having pdf \( f(x) \), then E(X) is called ……
   a). Arithmetic mean
   b). Geometric mean
   c). Harmonic mean
   d) First Quartile

12. If X is a r.v. and \( r \) is an integer, then \( E(X^r) \) represents
   a) \( r \)th central moment
   b). \( r \)th raw moment
   c) \( r \)th factorial moment
   d). none of these

13. For Bernoulli distribution with probability \( p \) of a success and \( q \) of a failure, the relation between mean and variance that holds is
   a). mean \(<\) variance
   b). mean = variance
   c). mean \( \geq \) variance
   d). None of these

14. The mean and variance of a binomial distribution are 8 and 4 respectively. Then \( P(X=1) \) is equal to
   a) \( 2^{\frac{1}{12}} \)
   b) \( 2^{\frac{1}{5}} \)
   c) \( 2^{\frac{5}{6}} \)
   d) \( 2^{\frac{1}{6}} \)

15. If \( X \sim B(n, p) \), \( n = 4 \) and also \( P(X = 2) = 3P(X = 3) \), the value of \( p \) is
   a). 1
   b). \( \frac{1}{3} \)
   c) \( \frac{9}{11} \)
   d). None of the above

16. If \( f(x, y) = 4xy; 0 < x < 1, 0 < y < 1 \), then \( E(y/x) = …… \)
   a). 4
   b). 2
   c). \( \frac{4}{3} \)
   d). \( \frac{2}{3} \)

18. \( E(Y/X = x) \) is called ……
   a). regression curve of \( x \) on \( y \)
   b). regression curve of \( y \) on \( x \)
   c). both a and b
   d). neither a nor b

19. If \( f(x, y) = 4xy; 0 < x < 1, 0 < y < 1 \), the covariance between \( x \) and \( y \) is….
   a) \( \frac{1}{48} \)
   b). \( \frac{1}{144} \)
   c) \( \frac{1}{4} \)
   d). None of these.

20. If \( X \) and \( Y \) are two independent r.v.s then \( E(XY) = …… \)
   a). \( E(X) + E(Y) \)
   b). \( E(X) - E(Y) \)
   c). \( E(X)E(Y) \)
   d). None of these.

21. If \( X \) and \( Y \) are two r.v.s, the correlation coefficient between \( X \) and \( Y \) lies between ……
   a). 0 and 1
   b). -1 and 0
   c). -1 and 1
   d). None of these.

22. If \( X \sim B(n, p) \), mean = 4, variance = \( 4/3 \), then \( P(X = 5) = …… \)
   a). \( \left( \frac{2}{3} \right)^6 \)
   b). \( \left( \frac{2}{3} \right)^5 \left( \frac{1}{3} \right) \)
   c). \( \left( \frac{1}{3} \right)^6 \)
   d). \( 4 \left( \frac{2}{3} \right)^6 \)
23. If $X \sim B(3, 1/2)$ and $Y \sim B(5, 1/2)$, the probability of $P(X+Y=3)$ is ....
   a).7/16     c).11/16
   b).7/32     d).None of the above.
24. If $X \sim B(n, p)$, the distribution of $Y = n - X$ is .......
   a).B(n,1)     c).B(n,p)
   b).B(n,x)     d).B(n,q)
25. A family of parametric distribution in which mean = variance is
   a).Binomial distribution
   b).Gamma distribution
   c).Normal distribution
   d).Poisson distribution
26. The distribution possessing the memoryless property is
   a).Gamma distribution
   b).Geometric distribution
   c).Hypergeometric distribution
   d).All the above
27. If $X \sim N(\mu, \sigma^2)$, the points of inflexion of normal distribution curve are
   a). $\mu$     c). $\sigma \pm \mu$
   b).$\mu \pm \sigma$     d). $\pm \sigma$
28. An approximate relation between QD and SD of normal distribution is
   a).5QD = 4SD     c).2QD = 3SD
   b).4QD = 5SD     d).3QD = 2SD
29. An approximate relation between MD about mean and SD of a normal distribution is
   a).5MD = 4SD     c).3MD = 3SD
   b).4MD = 5SD     d).3MD = 2SD
30. The area under the standard normal curve beyond the lines $z = \pm 1.96$ is
   a).95%     b).90%     c).5%     d).10%
31. Let $X$ is a binomial variate with parameters $n$ and $p$. If $n=1$, the distribution of $X$ reduces to
   a).Poisson distribution
   b).Binomial distribution
   c).Bernoulli distribution
   d).Discrete Uniform distribution
32. If a random variable $X$ has the following probability distribution $x : -1 -2 1 2$
   $p(x) : 1/3 1/6 1/6 1/3$ then the expected value of $X$ is
   a).3/2     c).1/2
   b).1/6     d).None of these
33. A box contains 12 items out of which 4 are defective. A person selects 6 items from the box. The expected number of defective items out of his selected item is
   a).2     c).3/2
   b).3     d).None of these.
34. If $X$ is a normal variate with mean 20 and variance 64, the probability that $X$ lies between 12 and 32 is
   a).0.4332     c).0.7475
   b).0.1189     d).0.5
35. If $Z$ is a standard normal variate, the proportion of items lying between $Z=-0.5$ and $Z=-3.0$ is
   a).0.4987  c).0.3072
   b).0.1915  d).0.3098

36. If $X$ is a normal variate representing the income in Rs.per day with mean $=50$ and SD$=10$. If the number of workers in a factory is 1200, then the number of workers having income more than Rs.62 per day is
   a).462  c).738
   b).138  d).None of these

37. Assuming that the height of students is distributed as $N(\mu, \sigma^2)$. Out of a large number of students, 5 % are above 72 inches and 10% are below 60 inches. The mean and SD of the normal distribution are
   a).$\mu = 0, \sigma = 1$  c).$\mu = 66, \sigma = 4$
   b).$\mu = 65, \sigma = 5$  d).$\mu = 65, \sigma = 4$

38. Probability mass function of a binomial distribution with usual notation is
   a).$^nP_x p^n q^{n-x}$
   b).$^nC_x p^n q^x$
   c).$^nC_x p^n q^{n-x} q^x$
   d).None of these.

39. If $X \sim N(8, 64)$, the standard normal variate $Z$ will be
   a).$Z = \frac{X-64}{8}$  c).$Z = \frac{X-8}{8}$
   b).$Z = \frac{X-8}{64}$  d).$Z = \frac{8-X}{8}$

40. The mgf of binomial distribution is
   a).$(q + pe^t)^n$  c).$(p + qe^t)^n$
   b).$(q + p)^n$  d).$(q + e^t)^n$

41. Binomial distribution with parameters $n$ and $p$ is said to be symmetric if
   a).$q < p$  c).$q > p$
   b).$q = p$  d).$q \neq p$

42. Let $X$ follows a poisson distribution with parameter , then mgf of $X$ is
   a).$e^{\lambda t - 1}$  c).$e^{\lambda (e^{it} - 1)}$
   b).$e^{\lambda (e^{it} - 1)}$  d).$e^{i\lambda (e^{it} - 1)}$

43. The distribution function of a continuous uniform distribution of a variable $X$ lying in the interval $(a,b)$ is
   a).$\frac{1}{b-a}$  c).$\frac{b-a}{x-a}$
   b).$\frac{x-a}{b-a}$  d).$\frac{x-b}{b-a}$

44. If $X \sim P(1)$ and $Y \sim P(2)$, then the probability $P(X + Y < 3)$ is
   a).$e^{-3}$  c).$4e^{-3}$
   b).$3e^{-3}$  d).$8.5e^{-3}$

45. Which of the following real life situations follow Poisson distribution
   a).The number of printing mistakes per page of a book
   b).The number of defects per item produced
   c).The number of persons arriving in a queue
   d).All the above.
46. Normal distribution was invented by
   a). Laplace  
   b). De-Moivre  
   c). Gauss  
   d). All the above.

47. If $X_1$ and $X_2$ are two independent Poisson variates with parameters $\lambda_1$ and $\lambda_2$ respectively, then the variable $(X_1 + X_2)$ follows.
   a). Binomial distribution with parameters $(\lambda_1 + \lambda_2)$
   b). Poisson distribution with parameter $(\lambda_1 + \lambda_2)$
   c). Either of a and b
   d). Neither of a and b

48. The skewness of a binomial distribution will be zero if
   a). $p < \frac{1}{2}$
   b). $p > \frac{1}{2}$
   c). $p = \frac{1}{2}$
   d). $p < q$

49. Binomial distribution tends to Poisson distribution when
   a). $n \to \infty$, $p \to 0$ and $np = \lambda$ (finite)
   b). $n \to \infty$, $p \to \frac{1}{2}$ and $\lambda = \lambda$ (finite)
   c). $n \to 0$, $p \to 0$ and $np \to 0$
   d). $n \to 0$, $p \to 0$ and $np \to -\infty$

50. A discrete random variable has pmf $p(x) = \frac{k}{q}; p + q = 1; x = 2, 3, 4, ...$
   The value of $k$ is
   a). $\frac{1}{q^2}$
   b). $\frac{1}{p}$
   c). $\frac{1}{q}$
   d). $\frac{1}{pq}$

51. If a discrete random variable takes on four values -1, 0, 3, 4 with probabilities $1/6, k, 1/4$ and $1-6k$, where $k$ is a constant. The value of $k$ is
   a). $1/3$
   b). $2/9$
   c). $1/12$
   d). $5/24$

52. Let $X$ be a continuous random variable with probability density function is
   $f(x) = kx; 0 \leq x \leq 1$  
   $= k; 1 \leq x \leq 2$  
   $= 0; otherwise.$
   The value of $k$ is equal to
   a). $1/4$
   b). $2/3$
   c). $2/5$
   d). $5/4$

53. For the distribution function of a random variable $X$, $F(5) - F(2)$ is equal to
   a). $P(2 < x < 5)$
   b). $P(2 \leq x \leq 5)$
   c). $P(2 < x \leq 5)$
   d). $P(2 < x < 5)$

54. If a continuous random variable $X$ has probability density function,
   $f(x) = \frac{1}{3}; 1 \leq x \leq 0 = \frac{2}{3}; 0 \leq x \leq 1$ then $E(X^2)$ is equal to
   a). $1/9$
   b). $2/3$
   c). $5/12$
   d). $1/3$

55. If binomial random variable has mean=4 and variance = 3, then its third central moment $\mu_3$ is
   a). $1/2$
   b). $5/2$
   c). $3/2$
   d). $7/4$

56. A Poisson random variable has $\mu_4 = 2$ the value of its mean is
   a). $1/3$
   b). $2/3$
   c). $1/4$
   d). $3/4$

57. A random variable has uniform distribution over the interval [-1,3].
   This distribution has variance equal to
   a). $8/5$
   b). $4/3$
   c). $13/4$
   d). $9/2$
58. For an exponential distribution with probability density function,
   \[ f(x) = \frac{1}{2} e^{-x/2}; x \geq 0 \]
   its mean and variance are
   a). \( \left( \frac{1}{2}, 2 \right) \)  
   b). \( \left( 2, \frac{1}{4} \right) \)  
   c). \( \left( \frac{1}{2}, \frac{1}{4} \right) \)  
   d). (2,4)

59. A normal random variable has mean=2 and variance = 4. Its fourth central moment \( \mu_4 \) will be
   a). 16  
   b). 64  
   c). 80  
   d). 48

60. If a random variable X has mean 3 and SD 5, then the variance of the variable
   \( Y = 2X - 5 \) is,
   a). 25  
   b). 45  
   c). 100  
   d). 50

61. Let \( X \sim N(\mu, \sigma^2) \), then the central moments of odd order are
   a). one  
   b). zero  
   c). infinite  
   d). positive

62. Let \( X \sim U(0, 1) \), then the variable \( y = 2 \log X \) follows
   a). Log-normal distribution  
   b). Gamma distribution  
   c). Chi-square distribution  
   d). Exponential distribution

63. If \( X \) is a standard normal variate, the \( \frac{1}{2}X^2 \) is a gamma variate with parameters
   a). 1,1/2  
   b). 1/2,1  
   c). 1/2,1/2  
   d). 1,1

64. If the mgf of a random variable \( X \) is \( \left( \frac{1}{3} + \frac{2}{3}e^t \right) \), then \( X \) is a
   a). Bernoulli variate  
   b). Poisson variate  
   c). Binomial variate  
   d). Negative binomial variate

65. If \( (X,Y) \) is a bivariate discrete random variable, the number of values which \( (X,Y) \)
   can taken in the X-Y plane is
   a). Infinite  
   b). finite  
   c). Any number of values  
   d). none of the above

66. The moment \( \mu_{1,1} \) of the bivariate distribution is called
   a). Var(X,Y)  
   b). Var(X), Var(Y)  
   c). Cov(X,Y)  
   d). Corr(X,Y)

67. Variance of \( X \) in a bivariate distribution of \( X \) and \( Y \) in terms of moments is
   represented by
   a). \( \mu_{20} \)  
   b). \( \mu_{02} \)  
   c). \( \mu_{11} \)  
   d). \( \mu_{00} \)

68. In rolling of two distinct dice at a time, the variable \( X \) is defined as the number
   greater than 2 and the variable \( Y \) as the sum of numbers of two dices is less than 10.
   These bivariate \( (X,Y) \) are
   a). continuous type  
   b). discrete type  
   c). both a and b  
   d). neither a nor b

69. The height of fathers and their sons form bivariate variables which are
   a). Continuous variables  
   b). Discrete variables  
   c). Pseudo variables  
   d). None of the above
70. If a bivariate normal distribution with parameter \((\mu_x, \mu_y, \sigma_x^2, \sigma_y^2, \rho)\) such that \(\sigma_x = \sigma_y, \rho = 0\), the distribution is known as 
   a). Uniform normal  
   b). Rectangular normal  
   c). Elliptical normal  
   d). Circular normal  

71. If in a bivariate normal distribution with parameter \((\mu_x, \mu_y, \sigma_x^2, \sigma_y^2, \rho)\) such that \(\sigma_x \neq \sigma_y, \rho = 0\), the distribution is named as 
   a). symmetrical normal  
   b). uniform normal  
   c). elliptical normal  
   d). circular normal  

72. If in a bivariate normal distribution of the variables \(x\) and \(y\), \(\rho_{xy} = 0\), it implies that \(x\) and \(y\) are 
   a). Uncorrelated but not independent  
   b). Uncorrelated and independent  
   c). Independent but not uncorrelated  
   d). Correlated and dependent  

73. Bivariate normal distribution is also named as 
   a). Bravais distribution  
   b). Laplace-Gauss distribution  
   c). Gaussian distribution  
   d). All the above  

74. Joint distribution function of \((X, Y)\) is equivalent to the probability 
   a). \(P(X = x, Y = y)\)  
   b). \(P(X \leq x, Y = y)\)  
   c). \(P(X = x, Y \leq y)\)  
   d). \(P(X \geq x, Y \geq y)\)  

75. For the joint pdf \(f(x,y)\), the marginal distribution of \(Y\) given \(X=x\) is given as 
   a). \(\sum_{x \leq x} f(x, y)\)  
   b). \(\int_{-\infty}^{\infty} f(x, y) dx\)  
   c). \(\int_{-\infty}^{\infty} f(x, y) dy\)  
   d). \(\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x, y) dx dy\)  

76. If \(X\) and \(Y\) are independent, the cumulative distribution \(F_{XY}(x, y)\) is equal to 
   a). \(F_X(x)F_Y(y)\)  
   b). \(P(X \leq x)P(Y \leq y)\)  
   c). both a and b  
   d). neither a nor b  

77. If the joint distribution of the variables \(X\) and \(Y\) is bivariate normal (BVN) \((0,0,1,1,\rho)\), the correlation coefficient between \(X^2\) and \(Y^2\) is equal to 
   a). 1  
   b). -1  
   c). \(\rho^2\)  
   d). 0  

78. The correlation coefficient \(\rho\) between two variables \(X_1\) and \(X_2\) for a bivariate population in terms of moments is 
   a). \(\frac{\mu_{22}}{\sqrt{\mu_{02}\mu_{20}}}\)  
   b). \(\frac{\mu_{11}}{\sqrt{\mu_{02}\mu_{20}}}\)  
   c). \(\frac{\mu_{12}}{\mu_{11}\mu_{22}}\)  
   d). \(\frac{\mu_{12}}{\sqrt{\mu_{20}\mu_{22}}}\)  

79. The conditional distribution of a discrete variable \(Y\) given \(X=x\) can be expressed as 
   a). \(F_{Y|X}(y|x) = P(Y \leq y/X = x)\)  
   b). \(F_{Y|X}(y|x) = P(Y = y/X = x)\)  
   c). \(F_{Y|X}(y|x) = \frac{P(Y \leq y/X = x)}{P(X = x)}\)  
   d). \(F_{Y|X}(y|x) = \frac{P(X = x/Y = y)}{P(X = x)}\)  

80. The conditional pdf of \(X\) given \(Y=y\) for a joint density \(f_{X,Y}(x, y)\) can be found by the formula 
   a). \(f_{X|Y}(x|y) = \frac{f_{X,Y}(x,y)}{f_Y(y)}\)  
   b). \(f_{X|Y}(x|y) = \frac{F_{X,Y}(x,y)}{f_Y(y)}\)  
   c). \(f_{X|Y}(x|y) = \frac{f_{X,Y}(x,y)}{f_Y(y)}\)  
   d). None of the above.
81. The conditional distribution of $X$ given $Y$ for the joint pdf $f(x,y)=3-x-y$ for $0< x,y \leq 1$ is

a). $f(x/y) = \frac{3-x-y}{3/y-1}$

b). $f(x/y) = \frac{5/2-y}{3-x-y}$

c). $f(x/y) = \frac{3/2-y}{3-x-y}$

d). None of the above

82. The conditional distribution of $Y$ given $X$ for the joint pdf $f(x,y)=3-x-y$ for $0 \leq x,y \leq 1$ is

a). $f(y/x) = \frac{3-x-y}{5/2-x}$

b). $f(y/x) = \frac{3/2-x}{5/2-x}$

c). $f(x/y) = \frac{3/2-y}{5/2-x}$

d). All the above.

83. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the marginal distribution of $X$ is

a). $f(x) = 3x$

b). $f(x) = 3/2x$

c). $f(x) = 3/4x$

d). None of the above

84. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the marginal distribution of $Y$ is

a). $f(y) = 3x$

b). $f(y) = \frac{3x}{2}$

c). $f(y) = 3/4y$

d). $f(y) = \frac{3}{2}y$

85. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the mean of $X$ is

a). $\mu_{1,0} = \frac{3}{4}$

b). $\mu_{1,0} = \frac{1}{2}$

c). $\mu_{1,0} = 1$

d). $\mu_{1,0} = 0$

86. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the conditional distribution of $Y$ given $X=x$ is,

a). $f(y/x) = \frac{3}{2}y$

b). $f(y/x) = \frac{3}{2}y$

c). $f(y/x) = 2y$

d). $f(y/x) = y$

87. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the $(2, 2)^{th}$ moment is

a). $\mu_{2,2} = \frac{1}{48}$

b). $\mu_{2,2} = \frac{1}{144}$

c). $\mu_{2,2} = \frac{1}{4}$

d). None of the above.

88. If the density function of bivariates $X$ and $Y$ is given by $f(x,y)=3xy$ for $0 \leq x \leq 1; 0 \leq y \leq 1$, the covariance between $X, Y$ is

a). $\mu_{1,1} = \frac{1}{4}$

b). $\mu_{1,1} = \frac{1}{4}$

c). $\mu_{1,1} = \frac{1}{144}$

d). None of the above.
89. If the density function of bivariates X and Y is given by 
\[ f(x, y) = 3xy \] for \( 0 \leq x \leq 1; 0 \leq y \leq 1 \), the variance of X is
   a). \( \mu_2,0 = \frac{1}{4} \) 
   b). \( \mu_2,0 = \frac{1}{16} \) 
   c). \( \mu_2,0 = \frac{1}{8} \) 
   d). None of the above.

90. The correlation coefficient between the variables X and Y having the joint density, 
\[ f(x, y) = 3xy \] for \( 0 \leq x \leq 1; 0 \leq y \leq 1 \), is
   a). \( \rho_{XY} = \frac{1}{3} \) 
   b). \( \rho_{XY} = \frac{1}{16} \) 
   c). \( \rho_{XY} = \frac{2}{6} \) 
   d). All the above.

91. Given the joint probability mass function of X and Y be 
\[ f(x, y) = \frac{1}{7} x y \] for \( X = 1, 2, 3; y = 1, 2 \), then \( P(x=3) \) is equal to
   a). \( \frac{3}{7} \) 
   b). \( \frac{1}{9} \) 
   c). \( \frac{4}{9} \) 
   d). \( \frac{4}{7} \)

92. Let \((X, Y)\) be jointly distributed with density function, 
\[ f(x, y) = e^{-x-y} \] for \( 0 < x < \infty, 0 < y < \infty \); otherwise Then X and Y are
   a). Independent 
   b). Both having the mean unity 
   c). Both having the variance unity 
   d). All of the above.

93. Let \( f(x, y) = 1; \) \( x < y < x, 0 < x < 1 \) then the marginal density function of X is
   a). \( 2x \) 
   b). \( 1 \) 
   c). \( \frac{1}{2}x \) 
   d). \( 2y \)

94. Let X be a random variable. Then \( f(x) = ke^{-2x}, x \geq 0 \) to be density function, k must be equal to
   a). \( 2 \) 
   b). \( 1/2 \) 
   c). \( 0 \) 
   d). \( 1 \)

95. Let X be a random variable. Then \( F(x) = k(1-e^{-x})^2, x > 0 \) is a distribution function, provided k is
   a). \( -1 \) 
   b). \( 1/2 \) 
   c). \( 1 \) 
   d). \( 2 \)

96. Let X and Y be two random variables. Then for \( f(x, y) = c(2x + y), 0 < x < 1, 0 < y < 2 \) to be a joint density function, c must be equal to
   a). \( 1/3 \) 
   b). \( 1/4 \) 
   c). \( 1/5 \) 
   d). \( 1 \)

97. Let X and Y be two random variables. Then for \( f(x, y) = kxy, 0 < x < 4, 1 < y < 5 \) to be a joint density function, k must be equal to
   a). \( 1/100 \) 
   b). \( 1/96 \) 
   c). \( 1/48 \) 
   d). None of these.

98. Let the distribution function of a random variable X be \( F(x) = 1 - e^{-2x}, x \geq 0 \). Then the density function is
   a). \( 1 - e^{-2x}, x > 0 \) 
   b). \( 2e^{-2x}, x > 0 \) 
   c). \( 1 - 2e^{-2x}, x \geq 0 \) 
   d). \( e^{-2x}, x > 0 \)
99. If $\text{Var}(x) = 1$, then $\text{Var}(2X \pm 3)$ is
   a) 5  b) 13  c) 4  d) 2

100. $E(X - k)^2$ is minimum when
   a) $k < E(X)$  b) $k > E(X)$
   c) $k = E(X)$
   d) $k = 0$

101. Let $X$ and $Y$ be two bivariate continuous random variables and $f(x,y)$ be its
    probability density function. Then random variables $x$ and $y$ are independent if
    $f(x,y) = f(x) \cdot f(y)$. Here $f(x)$ denote
   a) Values of function ‘f’ at ‘x’
   b) $\int_y f(x,y)dy$
   c) $\int_x f(x,y)dx$
   d) $\int_x \int_y f(x,y)dx\,dy$

102. Two fair dice are tossed. Let $x$ denote the difference (absolute) of 2 face numbers
    and $y$ their sum. Then $P(x=2, y=7)$ is
   a) $\frac{1}{36}$  b) $\frac{2}{36}$
   c) 0  d) $\frac{5}{36}$

103. Two perfect dice are thrown simultaneously. If $x =$ face number of the first dice
    and $y$ that on the 2nd dice, which of the following is zero?
   a) $P(x=1, y=1)$
   b) $P(x+y =1)$
   c) $P(x=2, y>3)$
   d) $P(x=y)$

104. Following table gives the joint probability distribution of $(x, y)$

<table>
<thead>
<tr>
<th>$y$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>$P(y)$</th>
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<tr>
<td>1</td>
<td>$1/30</td>
<td>1/30</td>
<td>2/30</td>
<td>1/30</td>
<td>5/30</td>
</tr>
<tr>
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<td>2/30</td>
<td>4/30</td>
<td>2/30</td>
<td>10/30</td>
</tr>
<tr>
<td>3</td>
<td>$3/30</td>
<td>3/30</td>
<td>6/30</td>
<td>3/30</td>
<td>15/30</td>
</tr>
<tr>
<td>$P(x)$</td>
<td>$6/30</td>
<td>6/30</td>
<td>12/30</td>
<td>6/30</td>
<td>1</td>
</tr>
</tbody>
</table>

Then the marginal probability distribution at $y = 3$ is
   a) $\frac{6}{30}$  b) $\frac{10}{30}$
   c) $\frac{12}{30}$
   d) $\frac{15}{30}$

105. If $f(x,y) = \frac{1}{8}(6-x-y)$, $0 < x < 2$, $2 < y < 4= 0$, other wise
    Then marginal probability of $x$ is
   a) $\frac{1}{4}(5-y)$
   b) $\frac{1}{3}(4-x)$
   c) $\frac{1}{4}(3-x)$
   d) $\frac{1}{5}(4-y)$

106. If $f(x,y)=2$, $0 < x < y < 1= 0$, otherwise, then the marginal probability density
    function of $y$ is.
   a) $2$, $0 < x < y$
   b) $2y$, $0 < y < 1$
   c) 0
   d) 1
107. If \( f(x, y) = \frac{2}{3}(x + 1) e^{-y}, 0 < x < 1, y > 0 = 0, \) otherwise, determine \( f(x/y) \)
   a) \( e^{-y} \)
   b) \( \frac{2}{3} (x+1) \)
   c) 0
   d) 1

108. Suppose \( F(x, y) \) be the joint distribution function for a continuous bivariate random variable \( x, y \). Then, which of the following is incorrect?
   a) \( F(\infty, \infty) = 1 \)
   b) \( F(\infty, -\infty) = 0 \)
   c) \( F(\infty, -\infty) = 0 \)
   d) \( F(-\infty, \infty) = 1 \)

109. Given the joint distribution function
   \[ F(x, y) = 1 - e^{-x} - e^{-y} - e^{-(x+y)}, x > 0, y > 0 \]
   = 0, otherwise
   What is \( f(x) \)?
   a) \(-e^{-x}\)
   b) \(e^{-y}\)
   c) \(e^{-x} \cdot e^{-y}\)
   d) \(e^{-y}\)

110. If \( F(x_1, x_2) = k \). \( X_1^2 \cdot X_2^2, 0 < x_1 1 < x_2 < 1 \) is a joint probability distribution function in 2 variables \( x_1 \) and \( x_2 \), then \( k = \)
   a) 9
   b) 12
   c) 18
   d) 10

111. If \( f(x, y) = e^{-(x+y)}, x > 0, y > 0 \)
   = 0, otherwise,
   then \( P(0 < x < 2, 1 < y < 3) \) is
   a) \(e^{-y}\)
   b) \(e^{-x}\)
   c) \(e^{-3} - e^{-1}\)
   d) \(e^{-5} - 2e^{-3} + e^{-1}\)

112. The joint probability function of \( x \) & \( y \) is given by
   \[ f(x, y) = 4xye^{-(x^2+y^2)}; x \geq 0, y \geq 0 \]
   Then \( f(x/y) \) is
   a) \(2xe^{-x^2}\)
   b) \(2ye^{-y^2}\)
   c) \(ye^{-y^2}\)
   d) \(xe^{-x^2}\)

113. The joint probabilities mass function of variable \( x_1 \& x_2 \)
   \[ P(x_1, x_2) = 0, \] otherwise
   Then marginal distribution functions \( P(x_1 = 3) \) is
   a) \(\frac{5}{21}\)
   b) \(\frac{7}{21}\)
   c) \(\frac{9}{21}\)
   d) \(\frac{12}{21}\)

114. If \( x \) & \( y \) are two random variables, then \( E(x+y) = \)
   a) \(E(x). E(y)\)
   b) \(E(x) + E(y)\)
   c) \(E(x) + E(y) - E(x, y)\)
   d) \(E(x) + E(y) - E(x).E(y)\)

115. Given \( \mu_{rs} = E(x^r y^s) - [E(x)]^r [E(y)]^s \), Then which of the following is true?
   a) \( \mu_{1,0} = 0 \)
   b) \( \mu_{0,1} = E(y) \)
   c) \( \mu_{2,0} = E(x^2) - E(x) \)
   d) \( \mu_{0,2} = E(y^2) - E(y) \)

116. If \( x \) and \( y \) are independent random variables, then which of the following in incorrect?
   a) \( V(x+y) = V(x) + v(y) \)
   b) \( V(x - y) = V(x) + v(y) \)
   c) \( \rho_{xy} \neq 0 \)
   d) \( \text{Cov}(x, y) = 0 \)
117. Consider the following table

<table>
<thead>
<tr>
<th>Y</th>
<th>X</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
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<tr>
<td>-1</td>
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<td>2/8</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3/8</td>
<td>2/8</td>
<td></td>
</tr>
</tbody>
</table>

a) $\frac{4}{8}$  

b) $\frac{2}{8}$  

c) $\frac{-3}{8}$  

d) $\frac{5}{8}$  

118. Variance of x is given by

a) $E(x - E(x))$  

c) $E(x^2) - [E(x)]^2$  

b) $E(x^2) - E(x)$  

d) $E(x^2)$  

119. The distribution of a random variable $x$ which takes 2 values 0 and 1 with respective probabilities $q$ and $p$ such that $(p+q)=1$ is called.

a) Bernoulli Distribution  

c) All of these  

b) Binomial distribution  

d) None of these  

120. For a binomial distribution $P(x) = nC_x P^x Q^{n-x}$, $x = 0, 1, 2... n$, which of the following is incorrect?

a) $\mu_1 = np$  

c) $\mu_2 = np + np$  

b) $\mu_2 = n(n-1) p^2 + np$  

d) $\mu_1 = 0$  

121. The measure of skewness $\beta_1$ is related to the central moments as

a) $\beta_1 = \frac{\mu_3}{\mu_2}$  

c) $\beta_1 = \frac{\mu^3}{\mu_2}$  

b) $\beta_1 = \frac{\mu_2}{\mu^3}$  

d) $\beta_1 = \frac{\mu_2}{\mu_3^3}$  

122. A curve is said to be lipokurtic if

a) $\frac{\mu_4}{(\mu_2)^2} - 3 > 0$  

c) $\frac{\mu_4}{(\mu_2)^2} - 3 = 0$  

b) $\frac{\mu_4}{(\mu_2)^2} - 3 < 0$  

d) None of these  

123. Given mean and variance of binomial distribution is 4 & 3 respectively.

Then its mode is

a) 3  

c) None of these  

b) 4  

d) Cannot be found  

124. The Poisson’s distribution is a limiting case of the binomial distribution under the following conditions, except one. Which one?

a) Number of trials is indefinitely large.  

b) Probability of success is indefinitely large  

c) $np = \lambda$  

d) Probability of failure is indefinitely large  

125. A random variable is said to be Poisson variate if it assumes non-negative values and its probability mass function is given by $P(x) =$

a) $\frac{e^{-\lambda} \lambda^x}{x!}, x = 0, 1, 2..., \infty$  

c) $\frac{e^{-\lambda} \lambda^x}{x!}, x = 0, 1, 2..., \infty$  

b) $\frac{e^{-\lambda} \lambda^x}{x!}, x = 0, 1, 2..., \infty$  

d) $\frac{e^{-\lambda} \lambda^x}{x!}, x = 0, 1, 2..., \infty$
126. If $x$ is a Poisson variate with $P(x=2) = 9 \times P(x=4) + 90 \times P(x=6)$, then mean=
   a) 1   b) 2   c) 3   d) -1

127. For a Poisson distribution having a double mode at $x=1$ and $x=2,$
what is $P(x=3)$?
   a) $\frac{4e^{-2}}{3}$   b) $\frac{4e^{-2}}{3}$
   c) $\frac{3e^{-2}}{4}$   d) $\frac{3e^{-2}}{4}$

128. $x$ and $y$ be independent Poisson variate such that $P(x=0) = P(x=2)$ & $P(y=1) = P(y=2).$ Then $V(x – y) =$
   a) $\sqrt{2} - 2$   b) $2 - \sqrt{2}$   c) $\sqrt{2} - 2$   d) $\sqrt{2} + 2$

129. A continuous random variable follows a standard normal distribution if its pdf
is given by
   a) $f(z) = \frac{1}{\sqrt{2\pi}} e^{z^2/2}, -\infty < z < \infty$
   b) $f(z) = \frac{1}{\sqrt{2\pi}} e^{-z^2/2}, -\infty < z < \infty$
   c) $\frac{1}{2\pi} e^{z^2/2}, -\infty < z < \infty$
   d) $\frac{1}{\sqrt{2\pi}} e^{-z^2/2}, -\infty < z < \infty$

130. The binomial distribution has number of parameters equal to _______
   a) two   b) one   c) four   d) three

131. The binomial distribution have mean equal to
   a) $\mu = p$   b) $\mu = npq$   c) $\mu = np$   d) None of these

132. In Binominal distribution the variance $\sigma^2$ and mean $\mu$ are related by
   a) $\sigma^2 = q\mu$   b) $\sigma^2 = \frac{\mu}{q}$
   c) $q^2\sigma^2 = \mu$   d) None of these

133. The range of the Bernoulli random variable is the set
   a) Set of real members   b) (0, 1)
   c) Set of integers   d) None of these

134. Let $\phi(x)$ be a standard normal distribution function. Then the following relation
holds.
   a) $\phi(-x) = \phi(x)$   b) $\phi(-x) = \phi(x) - 1$
   c) $\phi(-x) = 1 - \phi(x)$   d) $\phi(-x) = \phi(x) + 1$

135. The variance of the uniform (discrete) probability distribution is given by
   a) $\sum \frac{(x-\mu)^2}{k^2}$   b) $\sum \frac{x^2}{k}$
   c) $\sum x$   d) $k$

136. We get standard normal distribution from normal distribution if
   a) $\mu = 1$, $\sigma = 0$   b) $\mu = 0$, $\sigma = 1$
   c) $\mu = \sigma = 0$   d) $\mu = \sigma = 1$

137. Let $F(x)$ be a distribution function of normal distribution and $\phi(x)$ be a standard
distribution function. Then the following relation holds……
   a) $F(x) = \phi \left( \frac{x}{\sigma} \right)$   b) $F(x) = \phi(x)$
   c) $F(x) = \phi(\sigma)$   d) $F(x) = \phi \left( \frac{x-\mu}{\sigma} \right)$
138. Repeated trials are normally referred to ______
   a) Gamma distribution   b) Uniform distribution
   c) Bernoulli distribution   d) None of these

139. The mean and variance of Poisson distribution are same
   a) Always true   b) Always false
   c) Partially true   d) Partially false

140. When each term of the given series may assume the values of two or more than
two variables, the distribution is called
   a) Variate   b) Non variate
   c) Univariate   d) Bivariate

141. If $x$ is a random variable with $E(x) = \mu$ and $V(x) = \sigma^2$ then Chebyshev’s
    inequality is given by
   a) $P\left[|x - \mu| \geq k\sigma\right] \leq \frac{1}{k^2}, k > 0$
   b) $P\left[|x - \mu| \leq k\sigma\right] \geq 1 - \frac{1}{k^2}, k > 0$
   c) Both a and b   d) None of these
### ANSWERS

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