Department of Computer Science and Engineering

MA8402 - Probability and Queueing Theory

Unit II - MCQ Bank

UNIT – II – TWO DIMENSIONAL RANDOM VARIABLES

1. If X and Y are random variables having the joint density function f(x, y) = 1/ 8 (6-x-y),0 < x < 2, 2 < y < 4. Find P(X + Y < 3)

   A. *5/24*

   B. *23/24*

   C. *7/24*

   D. 11*/24*

   Answer: (**A**)

2. $E(XY) = E(X)E(Y)$ if X and Y are ------------ variables

   A. Dependent

   B. Independent

   C. Zero

   D. one

   Answer: (**B**)

3. If X and Y are independent, then their covariance is **---------.**

   A. Dependent

   B. Independent

   C. Zero

   D. one

   Answer: (**C**)

4. The regression lines of X on Y and Y on X are *5xx−yy=22,64xx−45yy=24* respectively. Find the means of X and Y.

   A. 5,6

   B. 6,7

   C. 7,8

   D. 6,8

   Answer: (**D**)

5. X and Y are independent random variables with variance 2 and 3. Find the variance of 3X+4Y

    A. 56

    B. 66

    C. 78

    D. 68

    Answer: (**B**)

6. The minimum and maximum values of the correlation coefficient are --- and -----.

    A. -1,1

    B. -1,0

    C. -1,-1

    D. 1,1

    Answer: (**A**)

7. If X and Y be integer valued random variables with $P(X = m, Y = n) = q^2 p^{m+n-2}$, n, m=1,2,3…..and $p + q = 1$. Are X and Y independent?

    A. YES

    B. NO

    Answer: (**A**)

8. If $f(x, y) = kxye^{-(x^2 + y^2)}$, $x \geq$, $y0 \geq 0$ is the joint pdf, find k .

    A. k = 4

    B. k = 6

    C. k = 8

    D. k = 10

    Answer: (**A**)

9. The joint p.m.f of (X,Y) is given by $P(x, y) = k(2x + 3y)$, x = ,1,;02y = ,13,.2.Find the value of k.

    A. k = 1/75.

    B. k = 1/72.

    C. k = 1/79.

    D. k= 1/80.

Answer: (**B**)

10. **If X and Y are independent RVs with variances 8and 5. find the variance of 3X+4Y.**

    A. 154

    B. 155

    C. 152

    D. 158

Answer: (**C**)

11. **Find the value of k if** $f(x, y) = k(1- x)(1- y)$ **for** $0 < x, y < 1$ **is to be joint density function.**

   A. **k = 4.**

   B. k = 5.

   C. k = 6.

   D. k= 7.

Answer: (**A**)

12. **If the joint pdf of (X,Y) is f (x, y) = 6e^{-2x-3y} , x ≥0 , y≥0 , find the conditional density of Y given X.**

   A. 3e^{-4y}, y≥0

   B. 3e^{-2y}, y≥0

   C. 3e^{-3y}, y≥0

   D. 3e^{-35y}, y≥0

Answer: (**C**)

13. **The joint p.d.f of (X,Y) is given by** $f(x, y) = 6e^{-(x+y)}$, $0 \leq x, y \leq \infty$.**Are X and Y independent?**

   A. YES

   B. NO

   Answer: (**A**)

14. **The regression lines between two random variables X and Y is given by** $3X + Y = 10$ **and** $3X + 4Y = 12$. **Find the correlation between X and Y.**

   A. r $= -\frac{2}{3}$

   B. r $= -\frac{3}{2}$

   C. r $= -\frac{1}{2}$

   D. r $= \frac{1}{2}$

Answer: (**C**)

15. $f_{XY}(x, y) = $ Cx(x-y), 0 < x < 2, -x < y < x

      0   , otherwise

 Find C.

   A. C= 1/18.

   B. C = 1/8.

   C. C = 1/7.

   D. C= 1/16.

Answer: (**B**)

16. If f(x, y) $= \frac{xy}{96}$, $0 < x < 4$, $1 < y < 5$, find E(X).

   A. **E(X) = 8/3.**

   B. E(x) = 3/8.

   C. E(x) = 1/8.

   D.E(x)= 1/32.

Answer: (**A**)

17. If the joint pdf of (X,Y) is f(x,y) $= \frac{1}{4}$, $0 \le x,y \le 2$, find P(X+Y $\le$ 1).

   A.P(X+Y $\le$ 1) =3/8

   B.P(X+Y $\le$ 1) =5/8

   C.P(X+Y $\le$ 1) =17/8

   D.P(X+Y $\le$ 1) =1/8

Answer: (**D**)

18. If X is a uniformly distributed RV in $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$, find the pdf of Y = tanX.

   A. $f_x(X) = \frac{1}{\pi(1+y^2)}$, $-\infty < y < \infty$

   B. $f_y(y) = \frac{1}{\pi(1+y^2)}$, $-\infty < y < \infty$

   C. $f_x(y) = \frac{1}{(1+y^2)}$, $-1 < y < 1$

   D. $f_y(y) = \frac{1}{\pi(1+y^2)}$, $-\infty < y < \infty$

Answer: (**B**)

19. Let X and Y be R.Vs having the joint **pdf** f(x, y) $= \frac{3}{2}$ (x²+y²) , $0 < x < 1$, $0 < y < 1$, find E(XY)

   A. E(XY) = 8/3.

   B. E(XY) = 3/8.

   C. E(XY) = 1/8.

   D.E(XY)= 1/32.

Answer: (**B**)

20. The tangent of the angle between the lines of regression y on x and x on y is 0.6 and $\sigma_x = \sigma_y/2$, find the correlation coefficient between x and y.

    A. $r = -\frac{2}{3}$

    B. $r = -\frac{3}{2}$

    C. $r = -\frac{1}{2}$

    D. $r = \frac{1}{2}$

  Answer: (**D**)

21. Find the rank correlation coefficient from the following data:

Rank in X: 1   2   3   4   5   6   7

Rank in Y: 4   3   1   2   6   5   7

    A. r = 0.2369

    B. r = 0.6429

    C. r = −0.6429

    D. r = -02369

  Answer: (**B**)

22. If the joint pdf of (X,Y) is given by $f_{XY}(x,y) = x + y$, $0 \le x,y \le 1$, find E(XY)

    A. **E(XY) = 1/3.**

    B. E(XY) = 3/8.

    C. E(XY) = 1/8.

    D.E(XY)= 1/32.

Answer: (**A**)

23. When will the two regression lines be at right angles

    A. $\pi/2$

    B. 2π

    C. Π

    D. 0

  Answer: (**A**)

24. The covariance of two random variables

    A. does not have an upper or lower bound.

    B. does not provide an indication of the direction of the relationship between the variables.

    C.is greatly influenced by the scaling of the numbers.

    D. both A and B

  Answer: (**D**)

25. Which of the following is equal to $\text{Var}(2X - 3Y)$, where X and Y are random variables on S?

A. $2\text{Var}(X) - 6\text{Cov}(X, Y) + 3\text{Var}(Y)$

B. $2\text{Var}(X) - 6\text{Cov}(X, Y) + 3\text{Var}(Y)$

C. $2\text{Var}(X) + 6\text{Cov}(X, Y) + 3\text{Var}(Y)$

D. $2\text{Var}(X) - 3\text{Var}(Y)$

Answer: (**A**)