1. If X and Y are independent random variables with variance 2 and 3 , then compute the variance of 3X+4Y
2. Given that joint pdf of (X, Y) is given by f(x, y) = , 0<x<2 and 0<y<3, compute the marginal density of X.
3. Show that the sample mean x ̅ is an unbiased estimator for the population mean 
4. If θ ̅ is an unbiased estimate of θ, then show that (θ^2 ) ̅ is a biased estimator of θ2
5. If X is a binomial variate with parameter n and p, then show that X/n , the observed proportion of success is an unbiased estimator of the parameter p.

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| **Sl.No** | **QUESTION** |
| 10 | (i)Two random variable X and Y have the joint density  **Compute** Cov(X,Y)  (ii) A coin is tossed 10 times, **Determine** the probability of getting 3 or 4 or 5 heads. Use Central Limit Theorem |
| 10 | (i) Let (X,Y) be a continuous 2D RV with JPDF f(x, y) = ,  0<x<1, 0<y<1.**Compute** the covariance between x and y.  (ii) **Compute** the correlation coefficient for the following heights (in inches) of fathers X and their sons Y.  X: 65 66 67 67 68 69 70 72  Y: 67 68 65 68 72 72 69 71 |
| 10 | (i)Let X and Y be discrete random variables with pdf f(x,y) = (x+y)/21 where x=1,2,3; y=1,2. **Calculate** the Correlation coefficient of (X,Y).  (ii) The equation of two regression lines got in a correlation analysis are  8x-10y +66=0 and 40x-18y-214=0. **Obtain** (i) the mean values of x and y.  (ii) the correlation coefficient between x and y. |
| 10 | (i) The joint probability mass function of (X,Y) is given by p(x,y) = K(2x+3y),  x = 0,1,2; y =1,2,3. **Calculate** all the marginal distributions of X and Y.  (ii)From the following data, **Obtain** (i) The two regression equations (ii) The coefficient of correlation between the marks in mathematics and statistics   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Marks in Mathematics | 25 | 28 | 35 | 32 | 31 | 36 | 29 | 38 | 34 | 32 | | Marks in Statistics | 43 | 46 | 49 | 41 | 36 | 32 | 31 | 30 | 33 | 39 | |
| 11 | (i)A random sample (x1,x2,x3,x4) of size 4 is drawn from a normal population unknown mean μ. Consider the following estimators to estimate μ. (i) t1= (x1+x2+x3+x4)/4, (ii) t2=((x1+x2+x3)/3)+x4, (iii) t3=(x1+2x2+λx3)/3, where λ is such that t3is an unbiased estimator. **Calculate** λ. Are t1 and t2 unbiased? State giving reasons the estimators which is best among t1,t2,and t3?  (ii)**Calculate** the maximum likelihood estimator for the parameter P of the binomial distribution B(N,P), where N is very large but finite, on the basis of sample of size n. Also find its variance. |