

Statistics and interencing

Activity - 03

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(1) Given information:-

X : gaussian Rv with mean $\mu_X = 3$, $\sigma_X^2 = 2$

V : gaussian Rv, independent of X , $\mu_V = 1$
and $\sigma_V^2 = 2$

$$Y = 3X + 2V$$

(2) Mean of Y :-

$$\mu_Y = 3\mu_X + 2\mu_V = 3(3) + 2(1)$$

$$\mu_Y = 9 + 2 = 11$$

(3) variance of Y :-

$$\sigma_Y^2 = 3^2 \cdot \sigma_X^2 + 2^2 \cdot \sigma_V^2$$

$$\sigma_Y^2 = 9(2) + 4(2)$$

$$\sigma_Y^2 = 18 + 8 = 26$$

(4) covariance of X and Y :-

$$\sigma_{XY} = 3 \cdot \text{var}(X) = 3 \cdot 2 = 6$$

(5) using the MSE criterion Given:-

$$\hat{X} = \mu_x + \frac{\sigma_{xy}}{\sigma_y^2} (y - \mu_y)$$

Substituting the known values;

$$\hat{X} = 3 + \frac{6}{26} (y - 11)$$

$$\hat{X} = 3 + \frac{3}{13} (y - 11)$$

Ans//