

Question 11.16.3.15

Probability and Random Processes

Sarvesh K
EE22BTECH11046*

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A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card.

Solution:

$$X = \begin{cases} 1, & \text{if the card is red} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

Hearts is a subset of red cards, hence X covers it.

$$Y = \begin{cases} 1, & \text{if the card is king} \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

The desired probability is

$$= 1 - p_{XY}(00) \quad (3)$$

$$= 1 - (1 - p_X(1))(1 - p_Y(1)) \quad (4)$$

$$= 1 - \left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{13}\right) \quad (5)$$

$$= 1 - \frac{6}{13} \quad (6)$$

$$= \frac{7}{13} \quad (7)$$