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Question 11.16.3.64 Probability and Random Processes

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Question:12/13/3/64

You are given that A and B are two events such that $Pr(B) = \frac{3}{5}, Pr(A|B) = \frac{1}{2} \text{ and } Pr(A+B) = \frac{4}{5}, \text{then } Pr(A)$ equals

Solution:

$$\Pr\left(A|B\right) = \frac{1}{2} \tag{1}$$

$$Pr(A|B) = \frac{1}{2}$$
 (1)

$$\frac{Pr(AB)}{Pr(B)} = \frac{1}{2}$$
 (2)

$$Pr(AB) = \frac{Pr(B)}{2}$$
 (3)

$$= \frac{3}{10}$$
 (4)

$$\Pr(AB) = \frac{\Pr(B)}{2} \tag{3}$$

$$=\frac{3}{10}\tag{4}$$

$$\Pr\left(A+B\right) = \frac{4}{5} \tag{5}$$

$$Pr(A + B) = \frac{4}{5}$$
 (5)
 $Pr(A) + Pr(B) - Pr(AB) = \frac{4}{5}$ (6)

$$Pr(A) = \frac{4}{5} - Pr(B) + Pr(AB)$$
 (7)

Substitute Pr(AB) from (4)

$$\Pr(A) = \frac{4}{5} - \frac{3}{5} + \frac{3}{10} \tag{8}$$

$$=\frac{1}{2}\tag{9}$$