Chapter-13 Probability

Excercise-3

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Question 12.13.5.6: If A and B are two independent events with $\Pr(A) = \frac{3}{5}$ and $\Pr(B) = \frac{4}{9}$ then, $\Pr(A'B')$

1) $\frac{4}{15}$
2) $\frac{8}{45}$
3) $\frac{1}{3}$
4) $\frac{2}{9}$

Solution: Using de morgan's law and axioms of probability,

$$\Pr(A'B') = \Pr((A+B)') \tag{1}$$

$$\Pr(A+B) = \Pr(A) - \Pr(B) - \Pr(AB) \tag{2}$$

Also, As A and B are independent,

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

Now,using the equations of (1), (2) and (3)

$$\Pr(A'B') = \Pr((A+B)') \tag{4}$$

$$= 1 - \Pr((A+B)) \tag{5}$$

$$= 1 - \Pr(A) - \Pr(B) - \Pr(A)\Pr(B) \tag{6}$$

$$= 1 - \left(\frac{3}{5}\right) - \left(\frac{4}{9}\right) - \left(\frac{3}{5}\right)\left(\frac{4}{9}\right) \tag{7}$$

$$= \frac{2}{9} \tag{8}$$