Exemplar - 12.13.3.3

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Question: The probability that at least one of the two events A and B occurs is 0.6. If A and B occur simultaneously with probability 0.3, evaluate $\Pr\left(\overline{A}\right) + \Pr\left(\overline{B}\right)$.

Solution: Given:

$$\Pr(AB) = 0.3 \tag{1}$$
$$\Pr(A + B) = 0.6 \tag{2}$$
$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \tag{3}$$
$$\implies 0.6 = \Pr(A) + \Pr(B) - 0.3 \tag{4}$$
$$\implies 0.9 = \Pr(A) + \Pr(B) \tag{5}$$

But

$$\Pr(A') = 1 - \Pr(A) \tag{6}$$
$$\Pr(B') = 1 - \Pr(B) \tag{7}$$
$$\therefore \Pr(A') + \Pr(B') = 2 - (\Pr(A) + \Pr(B)) \tag{8}$$
$$= 2 - 0.9 \tag{9}$$
$$= 1.1 \tag{10}$$