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Probability Assignment-II

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I. Problem

Given that the events A and B are such that P(A)=$\frac{1}{2}$, P(A + B)=$\frac{3}{5}$ and P(B)=p. Find p if they are
(i)mutually exclusive
(ii)independent

II. Solution

(i)mutually exclusive
Given A and B are mutually exclusive events, then,

$$P(A+B) = P(A) + P(B) \tag{1}$$
$$\frac{3}{5} = \frac{1}{2} + p \tag{2}$$
$$\therefore p = \frac{1}{10} \tag{3}$$

(ii)independent
Given A and B are independent events, then,

$$P(A+B) = P(A) + P(B) - P(AB) \tag{4}$$
$$P(A+B) = P(A) + P(B) - P(A)P(B) \tag{5}$$
$$\frac{3}{5} = \frac{1}{2} + p - \frac{p}{2} \tag{6}$$
$$\therefore p = \frac{1}{5} \tag{7}$$