Assignment 1

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Download all python codes from

```
https://github.com/Dishank422/AI1103-Probability
    -and-random-variables/blob/main/
    Assignment_1/codes
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and latex-tikz codes from

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https://github.com/Dishank422/AI1103-Probability
    -and-random-variables/blob/main/
    Assignment_1/main.tex
```

1 Problem(prob. misc. 6.11)

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

2 Solution

i) Since the events are mutually exclusive, by definition

$$P(AB) = 0 \tag{2.0.1}$$

$$\implies P(A+B) = P(A) + P(B) \tag{2.0.2}$$

On substituting the values of P(A), P(B) and P(A∪B) in (2.0.2), we get

$$\frac{3}{5} = \frac{1}{2} + p \tag{2.0.3}$$

$$\implies p = \frac{1}{10} \tag{2.0.4}$$

ii) Since the events are independent

$$P(AB) = P(A)P(B) \tag{2.0.5}$$

We know

$$P(A+B) = P(A) + P(B) - P(AB) \tag{2.0.6}$$

$$\implies P(A+B) = P(A) + P(B) - P(A)P(B) \tag{2.0.7}$$

On substituting the values of P(A), P(B) and P(A∪B) in (2.0.7), we get

$$\frac{3}{5} = \frac{1}{2} + p - \frac{1}{2}p \tag{2.0.8}$$

$$\implies p = \frac{1}{5} \tag{2.0.9}$$