# ASSIGNMENT-3

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## Exercise 16.3

**17)** A and B are events such that $P(A) = 0.42$, $P(B) = 0.48$ and P(A and B) = 0.16. Determine
(i) P(not A)
(ii) P(not B)
(iii) P(A or B)

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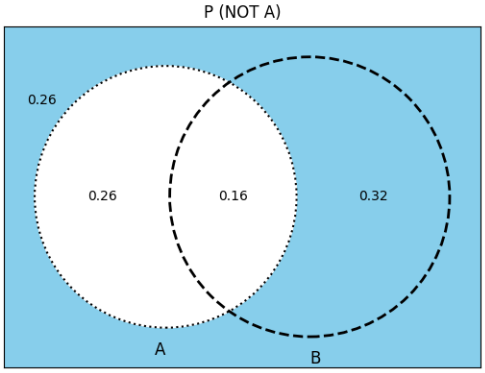


Figure 1: P(not A)

## Solution

There are two discrete groups A,B.let Y be discrete random variable such that

$$Y = \begin{cases} 1, & \text{if A is chosen} \\ 2, & \text{if B is chosen} \end{cases}$$

### (i) Determine p(not A)

Given $P(A) = 0.42$ so we have $P(X = 1) = 0.42$

$$\begin{aligned} P(A^{\complement}) &= 1 - P(X = 1) \\ &= 1 - 0.42 \\ &= 0.58 \end{aligned}$$

$$\therefore P(not\ A) = 0.58 \qquad (1)$$

### (ii) Determine p(not B)

Given $P(B) = 0.48$ so we have $P(X = 2) = 0.48$

$$\begin{aligned} P(B^{\complement}) &= 1 - P(X = 2) \\ &= 1 - 0.48 \\ &= 0.52 \end{aligned}$$

$$\therefore P(not\ B) = 0.52 \qquad (2)$$

***Verification***

```
Enter the value of P(A) =0.42
Enter the value of P(B) =0.48
Enter the value of p(A and B) =0.16
P(NOT A) = 0.58
P(NOT B) = 0.52
P(A OR B) = 0.74
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python code

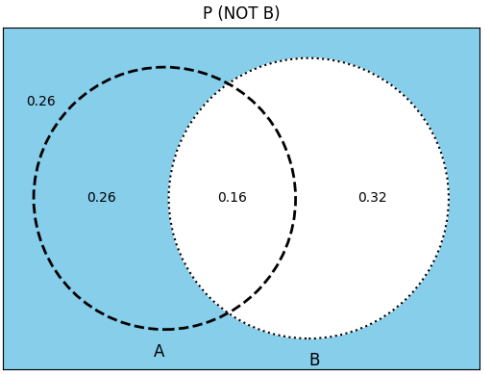


Figure 2: P(not B)

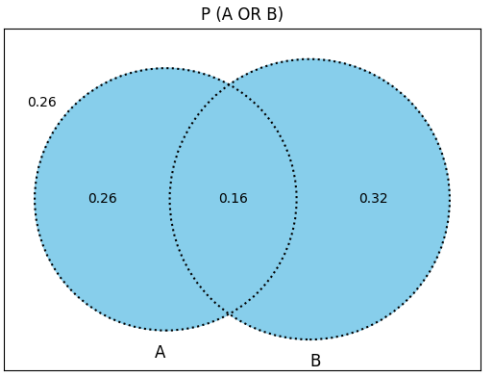


Figure 3: $P(A \cup B)$

## (iii) Determine p(A or B)

Given $P(A \cap B) = 0.16$ , $P(A) = 0.42$
$P(B) = 0.48$ so we have

$P\left(\bigcap_{i=1}^{2}(X = i)\right) = 0.16$

$$\begin{aligned} P\left(\bigcup_{i=1}^{2}(X = i)\right) &= P(X = 1) + P(X = 2) \\ &\quad - P\left(\bigcap_{i=1}^{2}(X = i)\right) \\ &= 0.42 + 0.48 - 0.16 \\ &= 0.74 \end{aligned}$$

$$\therefore P(A \; or \; B) = 0.74 \qquad (3)$$