

ASSIGNMENT-15

Unnati Gupta

Download all python codes from

[https://github.com/unnatigupta2320/
Assignment_15](https://github.com/unnatigupta2320/Assignment_15)

and latex-tikz codes from

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Assignment_15](https://github.com/unnatigupta2320/Assignment_15)

1 QUESTION No. 6.7

An electronic assembly consists of two subsystems, say, **A** and **B**. From previous testing procedures, the following probabilities are assumed to be known:

$$\Pr(\mathbf{A} \text{ fails})=0.2$$

$$\Pr(\mathbf{B} \text{ fails alone})=0.15$$

$$\Pr(\mathbf{A} \text{ and } \mathbf{B} \text{ fails})=0.15$$

Evaluate the following probabilities:

- i) $\Pr(\mathbf{A} \text{ fails} - \mathbf{B} \text{ has failed})$
- ii) $\Pr(\mathbf{A} \text{ fails alone})$

2 SOLUTION

1) Let the events be:-

Events	Description
E_A	The Event in which A fails
E_B	The Event in which B fails

2) According to question:

$$\Pr(E_A) = 0.2 \quad (2.0.1)$$

$$\Pr(E_A E_B) = 0.15 \quad (2.0.2)$$

3) Also, it is given that:

$$\Pr(\mathbf{B} \text{ fails alone}) = 0.15 \quad (2.0.3)$$

$$\therefore \Pr(\mathbf{B} \text{ fails alone}) = \Pr(E_B) - \Pr(E_A E_B) \quad (2.0.4)$$

On comparing, we get:

$$\Rightarrow 0.15 = \Pr(E_B) - 0.15 \quad (2.0.5)$$

$$\Rightarrow \Pr(E_B) = 0.3 \quad (2.0.6)$$

i)

$$\Pr(\mathbf{A} \text{ fails} - \mathbf{B} \text{ has failed}) = \frac{\Pr(E_A E_B)}{\Pr(E_B)} \quad (2.0.7)$$

$$\Pr(\mathbf{A} \text{ fails} - \mathbf{B} \text{ has failed}) = \frac{0.15}{0.3} \quad (2.0.8)$$

$$\therefore \Pr(\mathbf{A} \text{ fails} - \mathbf{B} \text{ has failed}) = 0.5 \quad (2.0.9)$$

ii)

$$\Pr(\mathbf{A} \text{ fails alone}) = \Pr(E_A) - \Pr(E_A E_B) \quad (2.0.10)$$

$$\Pr(\mathbf{A} \text{ fails alone}) = 0.2 - 0.15 \quad (2.0.11)$$

$$\therefore \Pr(\mathbf{A} \text{ fails alone}) = 0.05 \quad (2.0.12)$$