Assignment 3

S Goutham Sai - CS20BTECH11042

Download all python codes from

https://github.com/GouthamSai22/AI1103/blob/main/Assignment3/Codes

and latex-tikz codes from

https://github.com/GouthamSai22/AI1103/blob/main/Assignment3/main.tex

1 Problem 1 from GATE(MA) 2010

Let E and F be any two events with $P(E \cup F) = 0.8$, $P(E) = 0.4$ and $P(E|F) = 0.3$ then P(F) is

1) $\frac{3}{7}$
2) $\frac{4}{7}$
3) $\frac{3}{5}$
4) $\frac{2}{5}$

2 Solution

Given,

$$\Pr(E) = 0.4 \tag{2.0.1}$$
$$\Pr(E + F) = 0.8 \tag{2.0.2}$$
$$\Pr(E|F) = 0.3 \tag{2.0.3}$$

By definition,

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \tag{2.0.4}$$
$$\implies \Pr(EF) = \Pr(E|F) \times \Pr(F) \tag{2.0.5}$$
$$\implies \Pr(EF) = 0.3 \times \Pr(F) \tag{2.0.6}$$

Now using the identity,

$$\Pr(E + F) = \Pr(E) + \Pr(F) - \Pr(EF) \tag{2.0.7}$$

From (2.0.1),(2.0.2) and (2.0.6)

$$\implies 0.8 = 0.4 + \Pr(F) - (0.3 \times \Pr(F)) \tag{2.0.8}$$
$$\implies 0.4 = (1 - 0.3) \times \Pr(F) \tag{2.0.9}$$
$$\implies \Pr(F) = \frac{0.4}{0.7} \tag{2.0.10}$$

$$\boxed{\Pr(F) = \frac{4}{7}} \tag{2.0.11}$$