## 1

## Exemplar - 12.13.3.102

## EE22BTECH11039 - Pandrangi Aditya Sriram\*

**Question:** If A and B are two events such that Pr(A) > 0 and Pr(A) + Pr(B) > 1, then

$$\Pr(B|A) \ge 1 - \frac{\Pr(B')}{\Pr(A)}$$

## **Solution:**

$$Pr(B|A) = \frac{Pr(AB)}{Pr(A)}$$

$$= \frac{Pr(A) + Pr(B) - Pr(A + B)}{Pr(A)}$$
(2)

For any event E,  $Pr(E) \le 1$ 

$$Pr(A + B) \le 1$$

$$Pr(A + B) \le -1$$

$$Pr(A) + Pr(B) - Pr(A + B) \ge \frac{Pr(A) + Pr(B) - 1}{Pr(A)}$$

$$Pr(A) \ge \frac{Pr(A) - (1 - Pr(B))}{Pr(A)}$$

$$Pr(B|A) \ge \frac{Pr(A) - (1 - Pr(B))}{Pr(A)}$$

$$Pr(B|A) \ge \frac{Pr(A) - Pr(B')}{Pr(A)}$$

$$Pr(B|A) \ge 1 - \frac{Pr(B')}{Pr(A)}$$
(8)

.: Proved.