Assignment -2_3 *in* LaTeX

Muzaan Mohammed Faizel A P
EE22BTECH11036

Question 11.16.3.12: Check whether the following probabilities $\Pr(A)$ and $\Pr(B)$ are consistently defined

1) $\Pr(A) = 0.5$,$\Pr(B) = 0.7$, $\Pr(AB) = 0.6$

2) $\Pr(A) = 0.5$,$\Pr(B) = 0.4$, $\Pr(A + B) = 0.8$

Solution: The given probabilities are consistently defined if it satisfies the following properties:

$$\Pr(AB) \leq \Pr(A), \Pr(B) \tag{1}$$

$$0 \leq \Pr(A), \Pr(B), \Pr(AB), \Pr(A + B) \leq 1 \tag{2}$$

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \tag{3}$$

1) Given:

$$\Pr(A) = 0.5, \tag{4}$$

$$\Pr(B) = 0.7, \tag{5}$$

$$\Pr(AB) = 0.6 \tag{6}$$

Since

$$\Pr(AB) \geq \Pr(A) \tag{7}$$

$\Pr(A)$ and $\Pr(B)$ are not consistently defined.

2) Given:

$$\Pr(A) = 0.5, \tag{8}$$

$$\Pr(B) = 0.4, \tag{9}$$

$$\Pr(A + B) = 0.8 \tag{10}$$

From (**??**),

$$\Pr(AB) = 0.5 + 0.4 - 0.8 \tag{11}$$

$$= 0.1 \tag{12}$$

This also satisfies (**??**) and (**??**)
Therefore $\Pr(A)$ and $\Pr(B)$ are consistently defined.