

Assignment -2₃in \LaTeX

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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 Axiom 1 and the addition property:

$$0 \leq \Pr(A), \Pr(B), \Pr(AB), \Pr(A + B) \leq 1 \quad (1)$$

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \quad (2)$$

1) Given:

$$\Pr(A) = 0.5, \quad (3)$$

$$\Pr(B) = 0.7, \quad (4)$$

$$\Pr(AB) = 0.6 \quad (5)$$

From (??),

$$\Pr(A + B) = 0.5 + 0.7 - 0.6 \quad (6)$$

$$= 0.6 \quad (7)$$

This also satisfies (??),

Therefore $\Pr(A)$ and $\Pr(B)$ are consistently defined.

2) Given:

$$\Pr(A) = 0.5, \quad (8)$$

$$\Pr(B) = 0.4, \quad (9)$$

$$\Pr(A + B) = 0.8 \quad (10)$$

From (??),

$$\Pr(AB) = 0.5 + 0.4 - 0.8 \quad (11)$$

$$= 0.1 \quad (12)$$

This also satisfies (??),

Therefore $\Pr(A)$ and $\Pr(B)$ are consistently defined.