Assignment 1 in LaTeX

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Assignment 1

Problem 12.13.1.4 : Evaluate $\Pr(A+B)$ if $2\Pr(A) = \Pr(B) = \frac{5}{13}$ and $\Pr(A|B) = \frac{2}{5}$.
Answer 12.13.1.4 :
Given, $2\Pr(A) = \Pr(B) = \frac{5}{13}$, $\Pr(A|B) = \frac{2}{5}$

$$\implies \Pr(B) = \frac{5}{13}, \Pr(A) = \frac{5}{26}, \Pr(A|B) = \frac{2}{5} \tag{1}$$

$$\tag{2}$$

We know by conditional Probability:

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} \tag{3}$$

$$\Pr(AB) = \Pr(A|B) \times \Pr(B) \tag{4}$$

$$\Pr(AB) = \frac{2}{5} \times \frac{5}{13} = \frac{2}{13} \tag{5}$$

$$\tag{6}$$

Now, We know

$$\Pr(A+B) = \Pr(A) + \Pr(B) - \Pr(AB) \tag{7}$$

$$\implies \Pr(A+B) = \frac{5}{26} + \frac{5}{13} - \frac{2}{13} = \frac{5+10-4}{26} = \frac{15-4}{26} \tag{8}$$

$$\implies \Pr(A+B) = \frac{11}{26} \tag{9}$$

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