

# Assignment 1 in L<sup>A</sup>T<sub>E</sub>X

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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  $\Pr(A|B) = \frac{2}{5}$ .

**Solution 12.13.1.4 :** Given,

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

$$\Rightarrow \Pr(B) = \frac{5}{13}, \Pr(A) = \frac{5}{26}, \Pr(A|B) = \frac{2}{5} \quad (2)$$

$$(3)$$

We know by conditional Probability:

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} \quad (4)$$

$$\Pr(AB) = \Pr(A|B) \times \Pr(B) \quad (5)$$

$$\Pr(AB) = \frac{2}{5} \times \frac{5}{13} = \frac{2}{13} \quad (6)$$

$$(7)$$

Now, We know

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(AB) \quad (8)$$

$$= \frac{5}{26} + \frac{5}{13} - \frac{2}{13} \quad (9)$$

$$= \frac{5 + 10 - 4}{26} \quad (10)$$

$$= \frac{11}{26} \quad (11)$$

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