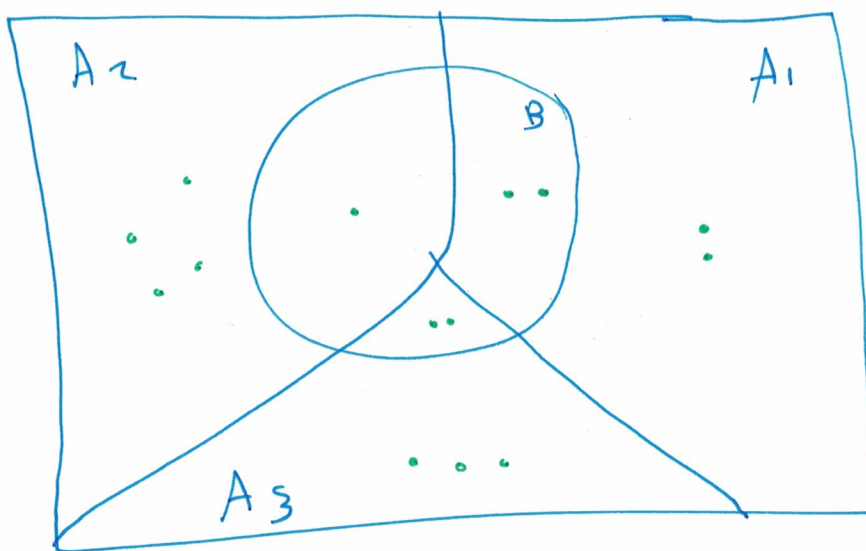Nasser Alrashi

$P(B) = \dfrac{5}{14}$

$P(A_2) = \dfrac{5}{14}$

$P(A_1) = \dfrac{4}{14}$

$P(A_3) = \dfrac{5}{14}$

$P(B|A_1) = \dfrac{2}{4}$

$P(B|A_2) = \dfrac{1}{5}$

$P(B|A_3) = \dfrac{2}{5}$

$P(B) = P(A_1)\, P(B|A_1) + P(A_2)\, P(B|A_2) + P(A_3)\, P(B|A_3)$

$\dfrac{5}{14} = \left(\dfrac{4}{14}\right)\left(\dfrac{2}{4}\right) + \left(\dfrac{5}{14}\right)\left(\dfrac{1}{5}\right) + \left(\dfrac{5}{14}\right)\left(\dfrac{2}{5}\right)$

$\dfrac{5}{14} = \dfrac{2}{14} + \dfrac{1}{14} + \dfrac{2}{14}$

$\dfrac{5}{15} = \dfrac{5}{15}$ both side equal

$\therefore P(B) = P(B \cap A_1) + P(B \cap A_2) + P(B \cap A_3)$

$P(B) = P(A_1)\, P(B|A_1) + P(A_2)\, P(B|A_2) + P(A_3)\, P(B|A_3)$

$P(B) = \displaystyle\sum_{j=1}^{k} P(A_j)\, P(B|A_j) \qquad \sum P(A_j) = 1$

Law of total probability

$\sum P(A_j) = P(A_1) + P(A_2) + P(A_3)$

$= \dfrac{4}{14} + \dfrac{5}{14} + \dfrac{5}{14} = \boxed{1}$