SDSC 2102 Statistical Methods and Data Analysis - Assignment 1

Question 1:

$$\begin{aligned} L.H.S &= P(A \cup B) \\ &= P(A - B) + P(A \cap B) + P(B - A) \\ &= P(A) - P(A \cap B) + P(A \cap B) + P(B) - P(A \cap B) \\ &= P(A) + P(B) - P(A \cap B) \\ &= R.H.S \end{aligned}$$

Question 2:

$$probability = 1 - \frac{\binom{39}{3}}{\binom{52}{3}} = 0.5865$$

Question 3a:

$$probability = \frac{80 + 60 - 50}{100} = 0.9$$

Question 3b:

$$probability = \frac{100 - 80 - 60 + 50}{100} = 0.1$$

Question 3c:

$$probability = \frac{60 - 50}{100} = 0.1$$

Question 4a: False.

Question 4b: True.

Question 4c: False.

Question 5:

$$probability = \frac{4P1 \times 5P2}{11P3} = 0.08081$$

Question 6:

$$probability = \frac{1}{6}\frac{\binom{5}{1}}{\binom{15}{1}} + \frac{1}{6}\frac{\binom{5}{2}}{\binom{15}{2}} + \frac{1}{6}\frac{\binom{5}{3}}{\binom{15}{3}} + \frac{1}{6}\frac{\binom{5}{4}}{\binom{15}{4}} + \frac{1}{6}\frac{\binom{5}{5}}{\binom{15}{5}} + \frac{1}{6}\frac{0}{\binom{15}{6}} = 0.07576$$

$$conditional\ probability = \frac{\frac{1}{6}\frac{\binom{5}{3}}{\binom{15}{3}}}{\frac{5}{66}} = 0.04835$$

Question 7:

$$probability = \frac{{}^{70}/_{50+75+100}}{25+45+{}^{70}/_{50+75+100}} = 0.5$$