Assignment_8.21476

Problem Statement 1:

Let X be the random variable representing number of questions answered wrong in a given MCQs test

$X \sim Bin(20, 0.75)$, therefore the probability is given by

$$P(X = 5) = \binom{n}{x} * p^x * (1-p)^{n-x}$$

$$= \binom{20}{5} * 0.75^5 * (1-0.75)^{20-5}$$

$$= 15504 * 0.2373 * (0.25)^{15}$$

$$\underline{= \mathbf{0.00000342}}$$

Problem Statement 2:

Let X be the random variable representing number of questions answered wrong in a given MCQs test

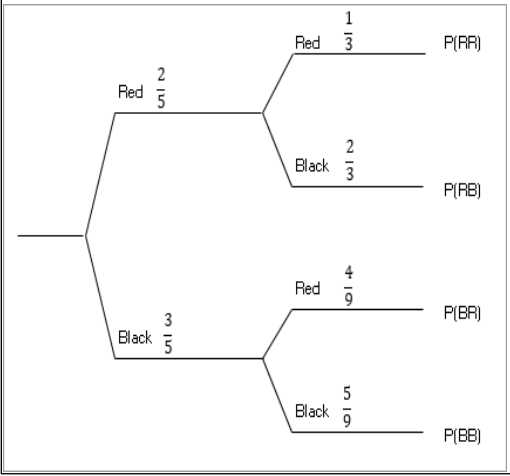
$X \sim Bin(50, 0.2)$, therefore since n is large, the distribution is approximated to the normal distribution $X \sim N(10, 8)$, (*with continuity correction*)

$$P(X = 5) = P\left(Z = \frac{x-\mu}{\sigma}\right)$$

$$= P\left(\frac{4.5-10}{\sqrt{8}} \leq Z \leq \frac{5.5-10}{\sqrt{8}}\right)$$

$$\underline{= \mathbf{0.0299}}$$

Problem Statement 3:



Outcome 1: $P(two\ red\ balls) = \frac{2}{5} \times \frac{1}{3} = \frac{2}{15}$

Outcome 2: $P(red\ ball\ first\ and\ black\ ball\ second)$

$$= \frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$$

Outcome 3: $P(black\ ball\ first\ and\ red\ ball\ second)$

$$= \frac{3}{5} \times \frac{4}{9} = \frac{4}{15}$$

Outcome 4: $P(two\ black\ balls) = \frac{3}{5} \times \frac{5}{9} = \frac{1}{3}$