AI 1110 Assignment 2

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12.13.6.04 Question: Suppose that 90 % of people are right-handed. What is the probability that atmost 6 of a random sample of 10 people are right-handed.

Answer: 0.0127951893

Solution: Let a binomial random variable be:

$$X \sim Bin(n, p) \tag{1}$$

$$\implies p = \frac{9}{10} \tag{2}$$

$$\implies n = 10 \tag{3}$$

where, p be the probability of a person being right-handed.

n is the number of people.

Let i be the number of times odd number occurs.

$$\therefore \Pr(X = i) = {}^{n}C_i p^i (1-p)^{n-i} \tag{4}$$

Let Cumulative Distribution function be:

$$F_X(i) = \Pr(X \le i) \tag{5}$$

$$\Pr(X = i) = {}^{10}C_i p^i (1-p)^{10-i} \tag{6}$$

$$\therefore F_X(i) = \sum_{r=0}^{i} {}^{10}C_r p^r (1-p)^{10-r} \tag{7}$$

$\therefore$,

$$\implies \Pr(X \le 6) = \sum_{i=0}^{6} \Pr(X = i) \tag{8}$$

$$= F_X(6) \tag{9}$$

$$= \frac{127951893}{10^{10}} \tag{10}$$

$$= 0.0127951893 \tag{11}$$