AI1110
PROBABILITY AND RANDOM VARIABLES
Assignment 1

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Question(12.13.6.4): Suppose that 90% of people are right-handed. What is the probability that at most 6 of a random sample of 10 people are right-handed?
Answer-$\sum_{r=0}^{r=6}\binom{10}{r}(0.9)^r(0.1)^{10-r}$**.**
Solution:

Let us consider a Binomail random variable X,

X=number of right-handed people among a random sample of 10 people.
X={0,1,2,3,4,5,6,7,8,9,10}
X=Bin(n,p)

Given that 90% of the people are right-handed.
Let **p** be the probability that the picked person is right-handed and **q** be the probability that the picked person is left-handed.

$$\Pr(X=k)=\binom{n}{k}p^k q^{n-k} \tag{1}$$

Cummulative distribution function of X:

$$F(X=k)=\Pr(X\leqslant k) \tag{2}$$

$$F(X=k)=\sum_{r=0}^{r=k}\Pr(X=r)=\sum_{r=0}^{r=k}\binom{n}{r}p^r q^{n-r} \tag{3}$$

Where

n=10
p=0.9
q=0.1

k denotes the values that the random variable X can take.
Probability that atmost 6 are right-handed among 10 is $\Pr(X\leqslant 6)$=F(X=6)

$$F(X=6)=\sum_{r=0}^{r=6}\binom{10}{r}(0.9)^r(0.1)^{10-r} \tag{4}$$