Q.No.1:- Prove the following statements mathematically:

a) The Probability Mass Function (PMF) of geometric distribution is valid.
b) The Cumulative Distribution Function (CDF) of geometric distribution is $F(x) = P(X \leq x) = 1 - (1-p)^x$.
c) The mean of geometric distribution is $\mu = E(x) = \frac{1}{p}$.
d) The variance of geometric distribution os $\sigma^2 = Var(x) = \frac{1-p}{p^2}$.

Q.No.2:- Identify the complete PMF of X for the following examples:

a) A coin is weighted in such a way so that there is a 70% chance of getting a head on any particular toss. Toss the coin, in exactly the same way, 100 times. Let X equal the number of heads tossed. What is the distribution of X?
b) A college administrator randomly samples students until he finds four that have volunteered to work for a local organization. Let X equal the number of students sampled. What is the distribution of X?
c) A Gallup Poll of n = 1000 random adult Americans is conducted. Let X equal the number in the sample who own a sport utility vehicle (SUV). What is the distribution of X?

Q.No.3:- A representative from the National Football League's Marketing Division randomly selects people on a random street in Kansas City, Kansas until he finds a person who attended the last home football game. Let p, the probability that he succeeds in finding such a person, equal 0.20. And, let X denote the number of people he selects until he finds his first success.

a) What is the probability that the marketing representative must select 4 people before he finds one who attended the last home football game?
b) What is the probability that the marketing representative must select more than 6 people before he finds one who attended the last home football game?
c) How many people should we expect (that is, what is the average number) the marketing representative needs to select before he finds one who attended the last home football game? And, while we're at it, what is the variance?

Q.No.4:- An oil company conducts a geological study that indicates that an exploratory oil well should have a 20% chance of striking oil.

a) What is the probability that the first strike comes on the third well drilled?
b) What is the probability that the third strike comes on the seventh well drilled?
c) What is the mean and variance of the number of wells that must be drilled if the oil company wants to set up three producing wells?