



IIT Madras

ONLINE DEGREE

Statistics for Data Science - 1
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Week 10 - Tutorial 1

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Suppose that 10% of the population is left-handed. Find the probability that in group of 20 individuals (each individual is either left handed or right handed) there will be exactly 3 left-handers.

$$\begin{aligned} p &= .10, \quad n = 20, \quad r = 3 \\ P(X=r) &= {}^nC_r p^r (1-p)^{n-r} \\ P(X=3) &= {}^{20}C_3 (.10)^3 (1-.10)^{20-3} \\ &= {}^{20}C_3 (.10)^3 (.90)^{17} \end{aligned}$$

Hello Statistics students. In this week tutorial we are going to solve problems related to binomial distribution. So, you must have seen in our lectures that in binomial distribution, we used to find the probability of r success in n trial, where each trial results in 2 outcomes. So, the probability of getting r success in n trial is given by ${}^nC_r \times p^r \times (1-p)^{n-r}$ where p is the probability of success.

So, suppose you have a problem, how can you identify that problem resembles with the binomial distribution? So, we will read the question, suppose that 10% of the population is left handed. Find the probability that in a group of 20 individuals, where each individual is either left handed or right handed there will be exactly 3 left handers.

So, each individual is left handed or right handed, so you have only 2 outcomes, either the individual is left handed or right handed. And the probability that he is a left handed, he or she is a left handed is 10%, that means the value of p is 0.10. Now, you have value of n here is 20, the value of r so in this question we have been asked, give me the probability that there will be exactly 3 left handers.

So, r is 3, so basically what we have to find is probability of getting 3 success in 20 individuals, that will be ${}^{20}C_3$, probability of success is 0.10^r that is 3, $(1 - p)$ that is $(1 - 0.10)^n$, n is $20 - 3$. This is nothing but ${}^{20}C_3(0.10)^3(0.9)^{17}$. So, this will be our answer in a group of 20 individual, what is the probability that there will be exactly 3 left handers. Thank you.

