**STATICS ASSIGNMENT\_2**

**1.Raindrops are falling at an average rate of 20 drops per square inch per minute. What would be a reasonable distribution to use for the number of raindrops hitting a particular region measuring 5 inches2 in t minutes? Why? Using your chosen distribution, compute the probability that the region has no rain drops in a given 3 second time interval. A reasonable choice of distribution is P**

A reasonable distribution to use for the number of raindrops hitting a particular region measuring 5 inches^2 in t minutes would be the Poisson distribution. The Poisson distribution is a discrete distribution that models the number of occurrences of a rare event in a fixed interval of time or space, given an average rate of occurrence. In this case, the average rate of raindrops hitting the region is 20 drops per square inch per minute, so the average number of raindrops hitting the region in t minutes would be 20 \* 5 \* t = 100t.

Using the Poisson distribution, the probability of having 0 raindrops in a given 3 second time interval (which is equivalent to 0.05 minutes) can be calculated as follows:

P(0 raindrops) = e^(-1000.05) \* (1000.05)^0 / 0!

Using this formula, the probability of having 0 raindrops in a given 3 second time interval is approximately 0.6065.

**2. Let X be a random day of the week, coded so that Monday is 1, Tuesday is 2, etc. (so X takes values 1, 2,..., 7, with equal probabilities). Let Y be the next day after X (again represented as an integer between 1 and 7). Do X and Y have the same distribution? What is P(X)**

No, X and Y do not have the same distribution.

For X, each day of the week has equal probability of occurring, so P(X) = 1/7 for each day of the week.

For Y, the probability of each day of the week occurring depends on the value of X. For example, if X = 1 (Monday), then Y can only be 2 (Tuesday) with probability 1. So, P(Y = 2) = P(X = 1). Similarly, for each day of the week, the probability of Y being the next day can be calculated based on the probability of X being the previous day.

So, X and Y have different distributions because their probabilities for each value are not equal.