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 choice of distribution is Poisson (λt), where λ = 20 · 5 = 100 (the average number of raindrops per minute hitting the region). Assuming this distribution,

P (no raindrops in 1/20 of a minute) = e^-100/20(100/20) ^0 / 0! = e^-5.

1. 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)

Let X = 1, Y = 2

P(X) = 1/7

P(Y) = 1/7

|  |  |  |  |
| --- | --- | --- | --- |
| X | Y | P(X) | P(Y) |
| 1 | 2 | 1/7 | 1/7 |
| 2 | 3 | 1/7 | 1/7 |
| 3 | 4 | 1/7 | 1/7 |
| 4 | 5 | 1/7 | 1/7 |
| 5 | 6 | 1/7 | 1/7 |
| 6 | 7 | 1/7 | 1/7 |

Follow same distribution as X and Y are having similar data distribution or you can say same probabilities

Here, P(X<Y) = 1/7 + 1/7 + 1/7 + 1/7 + 1/7 + 1/7 = 6/7 = 0.85