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

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Solution I :

Avg. Rain drops $u = 20$ per sq inch
                                    per min

Poission distribution will be used
to calculate drops in t min for
5 inch

because, - Rain drops rate given constant
         - Event is independent
         - Event is time based

Probability of region has no rain
drops in a given 3 seconds of interval

For 3 seconds,

   Avg rain $u = \dfrac{20}{60} \times 3 = 1$

$x = 0$

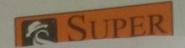$P(x) = \dfrac{e^{-u} u^x}{x!} = e^{-1} = 0.367$

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)

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Solution 2 :

For current day and next day
both having same Probability

$$P(x) = P(x+1) = \frac{1}{7}$$

so. both having same distribution

likewise Probability of any one
random day

$$P(x) = \frac{1}{7}$$

Any 2 random days $= \frac{2}{7}$
and same for next day also.