Date: _____

Name:
Saad Ahmad

Roll no:
20P-0051

Section:
BS(CS)-4A

Question # 1

Given that

$$p = \frac{3}{4} = 0.75$$

$$n = 4.$$

$$P\{X = 2\} = ?$$

As we know that

$$P\{X = i\} = \binom{n}{i} p^i (1-p)^{n-i}$$

Putting the values

$$P\{X = 2\} = \binom{4}{2} (0.75)^2 (1-0.75)^{4-2}$$

$$= 0.210$$

Date:

Question # 2

Defective rate of device = 3% = 0.03

$n = 20$.

We need to find the probability that there will be at least one defective item i.e

$$P\{X \geq 1\}$$

So for that we can ~~right~~ say that

$$P\{X \geq 1\} = 1 - P\{X = 0\}$$

$$P\{X \geq 1\} = 1 - \left[\binom{20}{0}(0.03)^0(1-0.03)^{20-0}\right]$$

$$= 1 - 0.543$$

$$P\{X \geq 1\} = 0.456$$

Question # 3

$p(\text{Accident}) = 0.005$

Let x be the number of accidents in any given period of 400 days.
So

$$\lambda = np$$

Date:

$\lambda = 400 \times 0.005$

$= 2$

So probability mass function of X is

$$P\{X = x\} = \frac{e^{-\lambda} \lambda^x}{x!}$$

$$= \frac{e^{-2} (2)^x}{x!}$$

a) We need to find $P(X = 1)$ so.

$$P\{X = 1\} = \frac{e^{-2} (2)^1}{1!}$$

$$= 0.2707$$

b) $P\{X \leq 3\} = ?$

$$P\{X \leq 3\} = P\{X = 0\} + P\{X = 1\} + P\{X = 2\} + P\{X = 3\}$$

$$= \frac{e^{-2}(2)^0}{0!} + \frac{e^{-2}(2)^1}{1!} + \frac{e^{-2}(2)^2}{2!} + \frac{e^{-2}(2)^3}{3!}$$

$$= 0.1353 + 0.2706 + 0.2706 + 0.1804$$

$$= 0.8571.$$

Date:

Question # 4

Given that $\lambda = 5$

a) $P\{x \leq 3\} = ?$

$P\{x \leq 3\} = P\{x=0\} + P\{x=1\} + P\{x=2\} + P\{x=3\}$

$$P\{x \leq 3\} = \frac{e^{-5}(5)^0}{0!} + \frac{e^{-5}(5)^1}{1!} + \frac{e^{-5}(5)^2}{2!} + \frac{e^{-5}(5)^3}{3!}$$

$P\{x \leq 3\} = 0.26$

b) $P\{x > 1\} = ?$

$P\{x \geq 1\} = 1 - P\{x=0\} - P\{x=1\}.$

$$P\{x \geq 1\} = 1 - \left[\frac{e^{-5}(5)^0}{0!} - \frac{e^{-5}(5)^1}{1!}\right]$$

$P\{x \geq 1\} = 0.95.$

Question #5

$p = 20\% \; 0.2$

$P\{x \geq 5\} = ?$

$P\{X \geq 5\} = 1 - P\{x < 5\}.$

$= 1 - P\{x < 5\}.$

Date:

But we have to find $P\{X<5\}$ ie

$$P\{X<5\} = P\{X=4\} + P\{X=3\} + P\{X=2\} + P\{X=1\} + P\{X=0\}$$

$$= \binom{10}{4}(0.2)^4(1-0.2)^6 + \binom{10}{3}(0.2)^3(1-0.2)^7 + \binom{10}{2}(0.2)^2(1-0.2)^8 + \binom{10}{1}(0.2)^1(1-0.2)^9 + \binom{10}{0}(0.2)^0(1-0.2)^{10}$$

$$= 0.96$$

Now:

$$P\{X \geq 5\} = 1 - P\{X<5\}$$

$$= 1 - 0.96$$

$$= 0.0328$$

b) $P\{X \geq 5\}$ for first occurrence of keyword

$$P\{x \geq 5\} = (1-p)^{i-1}$$

$$= (1-p)^{5-1}$$

$$= (1-p)^4$$

Date:

$$P\{X \geq 5\} = (1 - 0.2)^4$$

$$= 0.4096$$