Palestine Polytechnic University
Faculty of Applied Sciences

4507 - Introduction to Statistics

Quiz No. 3 | **Tuesday 26/4/2022** | **15 Minutes**

Instructor: *Dr. Monjed H. Samuh*

Std. Name: Key Std. ID:

Q1]. . . [8 points] Suppose the number of deaths from Covid-19 over a 1-year period is Poisson distributed with parameter $\lambda = 4.6$.

1. What is the probability distribution of the number of deaths over a 6-month period?

$$\boxed{\lambda^* = 2.3} \quad +\frac{1}{2}$$

$$P(x) = \frac{e^{-2.3}(2.3)^x}{x!} \; ; \quad x = 0, 1, 2, \ldots$$

+1 +1

2. What is the probability that in any given month at most one death will occur?

$$\boxed{\lambda^* = \frac{4.6}{12}} \quad +\frac{1}{2}$$

$$P(X \le 1) = P(X=0) + P(X=1) \quad +1$$

$$= e^{-\frac{4.6}{12}} + \left(\frac{4.6}{12}\right) e^{-\frac{4.6}{12}} \quad +1$$

$$= \frac{16.6}{12} e^{-\frac{4.6}{12}} \doteq 0.9429 \quad +1$$

3. Find the expected value and standard deviation of the number of deaths per year.

$$E(X) = \lambda = 4.6 \quad +1$$

$$\sigma = \sqrt{\lambda} = \sqrt{4.6} \doteq 2.1448 \quad +1$$

Q2]...[5 points] A small airport coffee shop manager found that the probabilities a customer buys 0, 1, 2, or 3 cups of coffee are 0.2, 0.45, 0.20, and 0.15, respectively. If 10 customers enter the shop, find the probability that 3 will purchase something other than coffee, 5 will purchase 1 cup of coffee, 1 will purchase 2 cups, and 1 will purchase 3 cups.

$$\binom{10}{3,5,1,1}(0.2)^3(0.45)^5(0.2)^1(0.15)^1 \quad +2$$

+2

$$= 0.0223 \quad +1$$

Q3]...[7 points] The average time spent by construction workers who work on weekends is 5.45 hours (over 2 days). Assume the distribution is approximately normal and has a standard deviation of 0.35 hour.

1. Find the probability that an individual who works at that trade works fewer than 6.5 hours on the weekend.

$$P(X < 6.5) = P\left(Z < \frac{6.5 - 5.45}{0.35}\right) \quad +1$$

+1

$$= P(Z < 3.00) = 0.9987$$

+1 $\quad +\frac{1}{2}$

2. If a sample of 25 construction workers is randomly selected, find the probability that the mean of the sample will be less than 6 hours.

$$P(\bar{X} < 6) = P\left(Z < \frac{6 - 5.45}{0.35/\sqrt{25}}\right) \quad +1$$

+1

$$= P(Z < 7.857) \quad +1$$

$$\simeq 1 \quad +\frac{1}{2}$$