SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term052-I

Quiz #4

Name: ID: Section: Serial:

Question One (3 + 2 = 5-Points)

Suppose that there are four defective power supplies in a package of 10. If two power supplies are randomly selected one after another without replacement, then:

a. What is the probability of one defective and one good power supply being selected?

Let D: Defective, G: Good

SS = {DD, DG, GD, GG)

$$P(\text{one defective, one good}) = P(DG) + P(GD)$$

$$= \frac{4}{10}\cdot\frac{6}{9} + \frac{6}{10}\cdot\frac{4}{9} = \frac{8}{15} = 0.5333$$

b. What is the probability of two power supplies being selected?

$$P(\text{two defective powers}) = P(DD)$$

$$= \frac{4}{10}\cdot\frac{3}{9} = \frac{2}{15} = 0.1333$$

Question Two (2 + 3 = 5-Points)

Consider the following probability distribution for a random variable X:

X	-1	0	2	3	5
P(x)	0.15	0.3	0.25	a	0.1

a. Find the value **a**

$$\sum_{all\ i} P(x_i) = 1 \Rightarrow 0.15 + 0.30 + 0.25 + a + 0.10 = 1$$

$$\Rightarrow 0.80 + a = 1 \Rightarrow a = 1 - 0.80 = 0.20$$

b. Find the mean for the random variable X

$$\text{The mean} = E(X) = \sum x\, p(x)$$

$$= (-1)(.15) + (0)(.3) + (2)(.25) + (3)(.2) + (5)(.1)$$

$$= -.15 + 0 + .5 + .6 + .5$$

$$= 1.45$$

SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term052-II

Quiz #4 Section:

Name: ID: Serial:

Question One (3 + 2 = 5-Points)

A small town has two ambulances. Records indicate that the first ambulance is in service 60% of the time and the second one is in service 40% of the time.

a. What is the probability that when an ambulance is needed, one will not be available?

Let E_1: The first ambulance is in service, so P (E_1) = 0.60

E_2: The second ambulance is in service, so P (E_2) = 0.40

E_1 and E_2 are independent

$$P(\text{One will not be avilable}) = P(E_1 \cap \overline{E_2}) + P(\overline{E_1} \cap E_2)$$

By indep.

$$= P(E_1)\,P(\overline{E_2}) + P(\overline{E_1})\,P(E_2)$$
$$= (0.6)(0.6) + (0.4)(0.4)$$
$$= 0.36 + 0.16 = 0.52$$

b. What is the probability that at least one ambulance will be available?

$$P(\text{At least one will be avilable}) = P(E_1 \cup E_2)$$
$$= P(E_1) + P(E_2) - P(E_1 \cap E_2)$$
$$= 0.6 + 0.4 - (0.6)(0.4)$$
$$= 0.76$$

Question Two (2 + 3 = 5-Points)

Consider the following probability distribution for a random variable X,

X	0	1	2	3	4
P(x)	0.25	0.1	0.3	0.15	0.2

a. Find the expected value of X

$$E(X) = \sum x\,p(x)$$
$$= (0)(.25) + (1)(.1) + (2)(.3) + (4)(.2)$$
$$= 0 + .1 + .6 + .45 + .8$$
$$= 1.95$$

b. Suppose that Y is another random variable, and the expected value of (Y – X) is 2, find the expected value of the random variable Y.

$$E(Y - X) = E(Y) - E(X) = 2$$
$$\Rightarrow \quad E(Y) = 2 + E(X)$$
$$= 2 + 1.95$$
$$= 3.95$$