SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term053-I
Quiz #4

Section:
Name: ID: Serial:

Question One (3 + 2 = 5-Points)

Suppose that there are three defective power supplies in a package of 8.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 so SS = {GG, GD, DG, DD}

$$P(\text{One Defective and One Good}) = P(DG) + P(GD)$$

$$= \left(\frac{3}{8}\right)\left(\frac{5}{7}\right) + \left(\frac{5}{8}\right)\left(\frac{3}{7}\right)$$

$$= \frac{15}{28} = 0.5357$$

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

$$P(\text{Two non-defective}) = P(GG)$$

$$= \left(\frac{5}{8}\right)\left(\frac{4}{7}\right) = \frac{5}{14} = 0.3571$$

Question Two (2 + 3 = 5-Points)

Consider the following probability distribution for a random variable X:

X	-2	0	2	3	4
P(x)	0.15	0.35	0.20	a	0.1

a. Find the value **a**

$$\sum P(x) = 1 \Rightarrow 0.15 + 0.35 + 0.20 + a + 0.1 = 1$$

$$0.80 + a = 1 \quad \Rightarrow \quad a = 1 - 0.8 = 0.2$$

b. Find the mean for the random variable X

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

$$= (-2)(0.15) + (0)(0.35) + (2)(0.2) + (3)(0.2) + (4)(0.1)$$

$$= -0.30 + 0 + 0.40 + 0.60 + 0.40$$

$$= 1.10$$

SOLUITIONS

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STAT-211-Term053-II
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Section:

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Question One (3 + 2 = 5-Points)

A small town has two ambulances. Records indicate that the first ambulance is in service 65% of the time and the second one is in service 50% of the time.

a. What is the probability that when an ambulance is needed, one will be available?

Let E_1 :The first ambulance is in service Þ $P(E_1) = 0.65$

E_2 :The second ambulance is in service Þ $P(E_2) = 0.50$

$$P(\text{one will be avilable}) = P(E_1 \cap \overline{E_2}) + P(\overline{E_1} \cap E_2)$$

By Independence $\Rightarrow$ $= P(E_1)\,P(\overline{E_2}) + P(\overline{E_1})\,P(E_2)$

$$= (0.65)(1-0.5) + (1-0.65)(0.50)$$
$$= 0.325 + 0.175 = 0.50$$

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

$$P(\text{At least one will be avilable}) = P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$$
$$= 0.65 + 0.50 - (0.65)(0.50)$$
$$= 0.825$$

Question Two (2 + 3 = 5-Points)

Consider the following probability distribution for a random variable X,

X	-1	0	1	3	4
P(x)	0.25	0.1	0.3	k	0.2

a. Find the value of k

$$\sum P(x) = 1 \Rightarrow 0.25 + 0.10 + 0.30 + k + 0.2 = 1$$
$$0.85 + k = 1 \quad \Rightarrow \quad k = 1 - 0.85 = 0.15$$

b. Find the expected value of X

$$\text{The mean} = E(X) = \sum x\ p(x)$$
$$= (-1)(0.25) + (0)(0.1) + (1)(0.3) + (3)(0.15) + (4)(0.2)$$
$$= -0.25 + 0 + 0.30 + 0.45 + 0.80$$
$$= 1.30$$