King Fahd University of Petroleum and Minerals
College of Sciences
Quiz #6(B)

St. ID: St. Name: Serial#:

Q1: Suppose that 10% of the items produced by a certain company is defective. A random sample of 9 items has been selected from the product of this company. Then find:

a) the probability that the sample contains at most 2 defective items.

Solution: Let X= the number of defective items in the sample. Then $X \sim b(9, 0.1)$ and $f(x) = (9Cx)(.1)^x (0.9)^{(9-x)}, x = 0,1,...,9$.

Then: P(that the sample contains at most 2 defective items)= $P(X \le 2)$

$= f(0) + f(1) + f(2) = (0.9)^{(9)} + 9(.1)(0.9)^{(8)} + 9C2(.1)^2(0.9)^{(7)}$

b) the probability that the sample contains at least 2 defective items given that the sample contains between 1 and 4 defective items .

Solution: P(that the sample contains at least2 defective items given that the sample contains between 1 and 4 defective items) = $P(X \ge 2 / 1 \le X \le 4)$

$= P(X \ge 2, 1 \le X \le 4) / P(1 \le X \le 4) = P(2 \le X \le 4) / P(1 \le X \le 4)$

$= (f(2) + f(3) + f(4)) / (f(1) + f(2) + f(3) + f(4))$

$$= \frac{(9C2(.1)^{(2)}(0.9)^{(7)} + 9C3(.1)^{(3)}(0.9)^{(6)} + 9C4(.1)^{(4)}(0.9)^{(5)})}{(9(.1)(0.9)^{(8)} + 9C2(.1)^{(2)}(0.9)^{(7)} + 9C3(.1)^{(3)}(0.9)^{(6)} + 9C4(.1)^{(4)}(0.9)^{(5)})}$$

c) What is the expected number of defective items in the sample?

Solution: The expected number of defective items in the sample = E(X)

$= (9)(0.1) = 0.9$

Q2: Let Z has a standard normal distribution. Then find:

a) $P(-1.04 \le Z \le 0.75)$

Solution: $P(-1.05 \le Z \le 75) = A(1.05) + A(0.75)$

$= 0.3531 + 0.2734 = 0.6265$

b) a such that $P(a \le Z) = 0.85$

Solution: $P(a \le Z) = 0.85$ implies that : $A(a) + 0.5 = 0.85$. Then $A(a) = 0.35$

Which implies that $a = - 1.04$