**MATH 131** **Section:**

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

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Q1: Suppose that 8% of the items produced by a certain company is defective. A random sample of 10 items has been selected from the product of this company. Then find:

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

**Solution:** Let X= the number of defective items in the sample. Then $X \sim b(10, 0.08)$ and $f(x) = (10Cx)(.08)^{x}(0.92)^{(10-x)}, x = 0,1,...,10$ .

Then P(that the sample contains at least 2 defective items)= $P(X \geq 2)$

$= 1 - P(X \leq 1) = 1 - f(0) - f(1) = 1 - (0.92)^{(10)} - 10(.08)(0.92)^{(9)}$

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

**Solution:** P(that the sample contains at most 2 defective items given that the sample contains between 1 and 4 defective items) = $P(X \leq 2/ 1 \leq X \leq 4)$

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

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

$$= \frac{(10(.08)(0.92)^{(9)} + 10C2(.08)^{2}(0.92)^{(8)})}{(10(.08)(0.92)^{(9)} + 10C2(.08)^{2}(0.92)^{(8)} + 10C3(.08)^{3}(0.92)^{(7)} + 10C4(.08)^{4}(0.92)^{(6)}}$$

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

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

= (10)(0.08) = 0.8

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

a) $P( -0.75 \leq Z \leq 1.05)$

**Solution:** $P( -0.75 \leq Z \leq 1.05) = A(1.05) + A(0.75)$

= 0.3531 + 0.2734 = 0.6265

b) a such that $P( a \leq Z ) = 0.93$

**Solution:** $P( a \leq Z ) = 0.93$ implies that : A(a) + 0.5 = 0.93. Then A(a) = 0.43

Which implies that a = - 1.48