# KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
## DEPARTMENT OF MATHEMATICS & STATISTICS
## DHAHRAN, SAUDI ARABIA

**STAT 319: Probability & Statistics for Engineers & Scientists**
Semester 153
First Major Exam
Wednesday, July 27, 2016
7:00−8:15 pm

Please circle your instructor name

Riaz                Saleh              Al-Momani            Malik

Name:                                   ID#:            Section #:      Serial #:

| Question No | Full Marks | Marks Obtained |
|:---:|:---:|:---:|
| 1 | 8 | |
| 2 | 6 | |
| 3 | 6 | |
| 4 | 8 | |
| 5 | 3 | |
| 6 | 9 | |
| Total | 40 | |

1. Hydraulic landing assemblies coming from an aircraft rework facility are each inspected for defects. Historical records indicate that 6% have defects in shafts, 4% have defects in bushings, and 2% have defects in both shafts and bushings. One of the hydraulic assemblies is selected randomly. What is the probability that the assembly has

   a. No bushing defect when it was known that there was no shaft defect?

   b. A shaft or bushing defect?

   c. Exactly one of the two types of defects?

   d. Neither type of defect?

2. In a certain day care class, 30% of the children have grey eyes, 50% of them have blue and the other 20% children's eyes are in other colors. One day they play a game together. In the first run, 65% of the grey eye ones, 82% of the blue eyed ones and 50% of the children with other eye color were selected. Now, if a child is selected randomly from the class, and we know that he/she was not in the first game, what is the probability that the child has blue eye?

3. Printed circuit cards are placed in a functional test after being populated with semiconductor chips. A lot contains 50 cards, and three cards are selected for functional testing. If five cards are defective, what is the probability that

a. At least two non-defective card are in the sample?

b. First card is defective and $3^{rd}$ is not defective?

4. An internet search engine looks for a certain keyword in a sequence of independent web sites. It is believed that 30% of the sites contain this keyword.

a. Compute the probability that the search engine had to visit at least three sites in order to find the first occurrence of a keyword.

b. Out of the first 10 websites, compute the probability that at exactly four of the websites contain the keyword.

c. Find the mean and the variance to the number of websites contain the keyword in 20 different websites?

5. Assume that on the average there are 10 telephone calls arrive at a phone exchange per hour. Compute the probability that there are exactly 2 calls from 11:35 am to 11:50 am.

6. If a contractor's profits on a construction job can be looked upon a continuous random variable having the probability density function

$$f(x) = c(x + 1) \quad 1 < x < 5$$

Where the units are $1000.

a) Find the value $c$ that makes the function probability density function

b) Find the probability for getting profit from 3 to 5 thousand dollars.

c) Find the expected profit.