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

STAT 319: Probability & Statistics for Engineers & Scientists
Semester 143
First Major Exam
Wednesday June 24, 2015
10:30 pm – 12:00 midnight

Please circle your instructor name:

Nasir Abbas Saddam Abbasi

Muhammad Riaz Farah Saleh

Name: ID #: Section #: Serial #:

Question No	Full Marks	Marks Obtained
1		
2		
3		
4		
5		
Total		

Q.No.1:- An extrusion die is used to produce aluminum rods. Specifications are given for the length and the diameter of the rods. For each rod, the length is classified as too short, too long, or OK, and the diameter is classified as too thin, too thick, or OK. In a population of 1000 rods, the number of rods in each class is as follows:

Length	Diameter		
	Too Thin	OK	Too Thick
Too Short	10	3	5
OK	38	??	4
Too Long	2	25	13

(a) Find missing value (??) in the table.
(b) If a rod is selected at random, what is the probability that it is either too short or too thick?
(c) Given that a rod is selected and found to meet the length specification, what is the probability that the rod also meets the diameter specification?
(d) Let A is the event that rod meets the length specification and B is the event that rod meets the diameter specification. Are A and B independent events? How?

Q.No.2:- If electricity power failures occur according to a Poisson distribution with an average of 3 failures every twenty weeks, calculate the probability that
(a) there will not be more than one failure during a particular week.
(b) we have to wait more than 5 weeks to see the next power failure?

Q.No.3:- Write the complete probability mass function (after putting values of all the parameters, involved) for variable X in the following examples:
(a) A college administrator randomly selects students until he finds a student that have volunteered to work for a local organization. The probability that student volunteers to work for a local organization is 0.15. Let X equal the number of students selected.
(b) A Quality Control Inspector (QCI) has to investigate a lot containing 25 pieces of metallic sheet out of which 22 have acceptable color. The QCI randomly selects 5 pieces of metallic sheet from the lot, without replacement. Let X equal the number of metallic sheets with acceptable color.

Q.No.4:- A gasoline station is supplied with gas once a week. If its weekly volume of sales (in ten thousands of gallon units) is a random variable with probability density function

$$f(x) = 5(1-x)^4, \quad 0 < x < 1$$

(a) What is the probability that the sales is between 2000 and 5000 gallons?
(b) If the station makes $2.5 per gallon, what is the expected volume of sales in dollars?

Q.No.5:- A factory contains three machines for the manufacturing of a particular product. Machine1 produces twice as compared to the other two machines whereas machine2 and machine3 produce equally. Further, the products are categorized as “defective” or “non-defective”. The defect rate for machine 1, 2, and 3 are 2%, 3%, and 2% respectively. If a random product was observed and found to be defective, which machine was most likely used and thus responsible? Explain.