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

STAT 319: Probability & Statistics for Engineers & Scientists
Semester 142
First Major Exam
Monday March 16, 2015
6:10 – 7:40 pm

Please circle your instructor name:

Abbas Al-Sawi Malik

Riaz Saleh Samuh

Name: ID #: Section #: Serial #:

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

Q.No.1:- In sampling from a production process that produces items of which 20% are defective, a random sample of 1000 items is selected each day. Approximate the probability that the number of defectives in a sample is at most three hundred.

Q.No.2:- The average amount of meat that a person consumes per year is 218.4 pounds. Assume that the standard deviation is 25 pounds and the distribution is approximately normal.

a) If a sample of 40 individuals is selected, find the probability that the sample mean will be between 215.5 and 221.4 pounds per year.
b) Find 90^{th} percentile of the sample mean amount of meat that a person consumes per year.
c) What should be the sample size such that the probability of sample mean (consumption of meat per year) being greater than 226.1 is 5%?
d) Find the probability that a person selected at random consumes less than 224 pounds per year.
e) What must be the sample size such that the probability is 0.95 that the error will not exceed 4 pounds?

Q.No.3:- The following data represent the working hours of a sample of 25 machines in a production process:

23	27	28	31	33	35	35	36	38	39	40	42
43	44	44	47	48	49	52	53	56	61	64	

where $\sum x=968$, $\sum x^2 = 43268$

For the above working hours data (**<u>interpret your findings in each part</u>**):

a) Construct a stem and leaf display and comment on its shape.
b) Find the median, the sample mean, and the sample variance.
c) Find the lower quartile, upper quartiles and 60^{th} percentile.
d) Compute the range and interquartile range of the data.
e) Construct a box plot for the ages and identify any outliers.

Q.No.4:- The thickness of a washer in mm is a random variable with probability density function

$$f(x) = \begin{cases} a\,x(6-x), & 2 < x < 4 \\ 0 & \text{otherwise} \end{cases}$$

a. Find the value of the constant a.
b. What is the probability that the thickness is less than 2.5m?
c. Find the mean thickness.
d. Find the median thickness.

Q.No.5:- The number of defective parts in the output of a machine is approximately a Poisson process at a mean rate of 30 defectives per hour. What is the probability that we have to wait more than 3 minutes to find the next defective part?

With the Best Wishes