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	**05**	
2	**12**	
3	**13**	
4	**09**	
5	**05**	
Total	**44**	

Q.No.1:- (5 points) 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 two hundred and twenty.

Q.No.2:- (3×4=12 points) 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.

Q.No.3:- (13 points) 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 (**interpret your findings in each part**):

a) Construct a stem and leaf display and comment on its shape (3 points).

b) Find the median, the sample mean, and the sample variance (3 points).

c) Find the lower quartile, upper quartiles and 70^{th} percentile (3 points).

d) Compute the range and interquartile range of the data (1 point).

e) Construct a box plot for the working hours and identify any outliers (3 points).

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Q.No.4:- (9 points) The thickness of a washer in mm is a random variable with probability density function

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

a. Find the value of the constant a (2 points).

b. What is the probability that the thickness is less than 1.5mm (2 points)?

c. Find the mean thickness (2 points).

d. Find the median thickness (3 points).

Q.No.5:- (5 points) 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