KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 131

STAT 319 Statistics for Engineers and Scientists

Second Major Exam   Monday October 28, 2013

Please check/circle your instructor's name

□ Abbasi   □ Anabosi   □ Jabbar   □ Al-Sabah   □ Saleh   □ Alsawi

Name _____   ID # _____ Section# _____

☺Important Note:

Show all your work including formulas, intermediate steps and final answer.

Question	Full Marks	Marks Obtained
1	21	
2	5	
3	3	
4	6	
5	5	
Total	40	

1) The following data are the temperatures of effluent at discharge from a sewage treatment facility on consecutive days:

36	39	41	41	42	42	42	43
44	44	44	45	46	46	52	55

a) Calculate the mean, median, mode and variance. (You may want to use $\sum x = 702$, and $\sum x^2 = 31114$) *(4pts.)*

b) Use the information above to comment on the shape of the data. *(1pt.)*

c) Is the empirical rule satisfied? Explain. *(3pts.)*

d) Construct a frequency histogram including the interval (40,45]. *(3pts.)*

e) From part d), approximate the mean of the data. *(2pts.)*

f) Construct a box plot of the data, and comment. *(5pts.)*

g) Find 95th percentile and explain its meaning in terms of the temperature of sewage discharge. *(3pts.)*

2) The proportion of impurities Y in a batch of product of a chemical process has the density function

$$f(y) = \begin{array}{ll} 10\,(1\text{-}y)^9 & 0 < y < 1 \\ 0 & \text{elsewhere} \end{array}$$

A batch is considered not acceptable if the percentage of impurities exceeds 60%. What is the percentage of batches that are not acceptable? *(3pts.)*

3) The reliability of an electrical fuse is the probability that a fuse, chosen at random from production, will function under its designed conditions. A random sample of 1000 fuses was tested and 27 defectives were observed. Calculate the approximate probability of observing 27 or more defectives, assuming that the fuse reliability is 0.98.

(5pts.)

4) Light bulbs produced by a certain manufacturer have a useful life that is normally distributed with a mean of 250 hours and a variance of 2500.
   a) What is the probability that a randomly selected bulb from this production process will have a useful life between 190 and 270 hours? *(4pts.)*

   b) Find the number of hours that only 10% of the bulbs live longer than. *(2pts.)*

5) The length of time for one individual to be served at a cafeteria is a random variable having an exponential distribution with a mean of 4 minutes.
   a) What is the probability that a person is served in less than 3 minutes? *(2pts.)*

   b) What is the median time of service? *(3pts.)*