KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 133

STAT 319 Statistics for Engineers and Scientists

Second Exam   Thursday July 10, 2014

Please circle your instructor name

      Mr. Malik   Mr. Al- Sawi   Mr. Saleh

Name: _____ ID #:_____Section #____

Important Note:

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

Question No	Full Marks	Marks Obtained
1	20	
2	5	
3	5	
4	5	
5	5	
Total	40	

Q1: The number of defective items produced by a machine and recorded for the last 25 days are as follows

5	5	6	7	8	9	10	12	14
14	15	15	16	17	17	17	19	19
20	22	23	23	27	28	29		

You may use $\sum x = 397, \quad \sum x^2 = 7507$

a. Find the mean, median, mode and the standard deviation. Comment on the shape using these numbers. (5 pts)

b. Do the data satisfy the first condition of the Empirical Rule? Explain. (3 pts)

c. Construct a relative frequency histogram including the interval $[10, 15)$. Comment on the graph. (4 pts)

d. Using the midpoints of the class frequency distribution above, approximate the mean. Comment on the approximate value. (3 pts)

e. Draw a box plot and comment on it. Is there any outliers? Explain. (5 pts)

Q2: The average life of a certain type of compressor is 10 years with standard deviation of 1 year. The manufacturer replaces free all compressors that fail while under guarantee. Assume the lives of the compressors follows a Normal distribution.

    a. If a compressor selected randomly, find the probability that it has survived more than 11 years   (2 pts)

    b. If they are willing to replace only 3% of all the compressors sold, how long a guarantee should they offer?   (3 pts)

Q3: The time required to repair a machine is an exponential random variable with rate 0.5 downs/hour.

    a. What is the probability that a repair time exceeds 2 hours?   (2 pts)

    b. What is the probability that the repair time will take at least 4 hours given that the repair man has been working on the machine for 3 hours?   (3 pts)

Q4: suppose that number of asbestos particles in a sample of one square centimeter of dust is a Poisson random variable with a mean of 1000. Approximate the probability that ten square centimeter of dust contains more than 10000 particles? (5 pts)

Q5: A pelletizing process is said to be in control if the mean crushing strength is 250 kilograms. It is known that the crushing strength measurements are normally distributed with standard deviation of 40 kilograms. A random sample of size 10 are taken from this process and the process is said to be "out of control" if the sample mean is less than 230 kilograms

a. Find the probability that, if the process under control, a randomly selected sample will indicate that it is not under control. (2 pts)

b. If a sample yields a mean crushing strength over 275 kilograms, would you say that the process is in control? Explain, using a probability argument (3 pts)