KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICAL SCIENCES
DHAHRAN, SAUDI ARABIA

STAT 319: PROBABILITY & STATISTICS FOR ENGINEERS & SCIENTISTS

Mid Term Exam No.1, Semester 052
Time: 7.30- 9.00 p.m., March 22, 2006

Please circle the name of your instructor; Write CLEARLY your name and Section Number. Not doing so will cost you ONE mark each.

Instructors:
Musawar Malik,
Ibrahim Rahimov,
Anwar Joarder.

Student Surname: ID#   Section #

Question No	Full Marks	Marks Obtained
1	10	
2	7	
3	8	
4	10	
5	10	
6	5	
7	10	
Total	60	

1. [5+5] The following data reflect the number of customers who test drove new cars each day for a sample of 20 days at the Redfield Ford Dealership.

5	7	2	9	4
9	7	10	4	7
5	6	4	0	7
6	3	4	14	6

Use values: $\sum x = 119$ and $\sum x^2 = 889$.

a) Calculate the coefficient of skewness and interpret this value.

b) Calculate the percentage of the data which lies within two standard deviation. Is empirical rule satisfied for given data?

2. [4+3] Power companies need information about customer usage to obtain accurate forecast of demands. Investigation from Wisconsin Power and Light determined energy consumption during a particular period for a sample of 90 gas-heated homes. An adjusted consumption value was calculated as follows:

Class	1-3	3-5	5-7	7-9	9-11	11-13	13-15	15-17	17-19
Frequency	1	1	11	21	25	17	9	4	1

a) Plot the relative frequency histogram and comment on the shape of the distribution.

b) Calculate the cumulative relative frequency for the middle class.

3. **[5+3] a)** The following data reflect the number of customers who return merchandise for a refund on Monday. Note these data reflect the sample of 10

40	12	17	25	9
46	13	22	16	7

Mondays for which data are available.
Find upper quartile and explain what its value means to you.

b) (This part of the question has no any relation to part (a)). A Company has two assembly lines in its plant. Line A produces an average of 335 units per day with a standard deviation equal to 11 units. Line B produces an average of 145 units per day with a standard deviation equal to 8 units. Based on this information compare the variability of the number of units produced by these two lines.

4. **[2+2+2+2+2]** At KFUPM, 10% of the student population is international students. Also, 40% of KFUPM students are taking business courses. However, 54% of KFUPM students are nether international students nor taking business courses. Let A = international students and B = taking business courses.

    a. Find P(A) and P($\overline{\text{B}}$)

    b. Find P(A U B)

    c. Find P(A | B).

    d. Are the events A and B **independent**? **Why**?

    e. Are the events A and B **mutually exclusive**? **Why**?

5. [5+5] Consider a testing procedure of items for defects. When test applied to a defective item, it will indicate so with probability 0.92. When it applied to a non defective item test will give positive result with probability 0.04. It is known that only 0.01% of the population of items is defective.

a) If an item is selected randomly and tested what is the probability that result is positive?

b) If result is positive, what is the probability that selected item is defective?

6. [5] A school class of 120 students are driven in 3 buses to visit an Ancient Masjid. There are 36 students in one of the buses, 40 in another, and 44 in the third bus. When the buses arrive, one of 120 students realized that he lost his student ID. Let X denote the number of students on the bus of that student, who lost his ID.

    a) Determine probability distribution of X.

    b) Find expected number of students in the bus of that student.

7. [5+5]. The amount of time, in hours, that a computer works before breaking down is a random variable with density function:

$$f(x) = ae^{-x/100}, \ x \geq 0.$$

a) What is value of parameter a?

b) What is the probability that the computer will work more than 50 but less than 150 hours before breaking down?