

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 111

STAT 319: PROBABILITY & STATISTICS FOR ENGINEERS & SCIENTISTS

First Major Exam Monday October 24, 2011

Please check/circle your instructor's name

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| <input type="checkbox"/> Anabosi | <input type="checkbox"/> Joarder | <input type="checkbox"/> Muttlak |
| <input type="checkbox"/> Riaz | <input type="checkbox"/> Alsawi | <input type="checkbox"/> Al-Sabah. |

Name: _____ ID #: _____

☺ Important Note:

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

Question No	Full Marks	Marks Obtained
1	7	
2	8	
3	7	
4	3	
5	5	
Total	30	

1) Given the following frequency table:

Interval	Frequency
(60 – 65]	3
(65 – 70]	5
(70 – 75]	7
(75 – 80]	8
(80 – 85]	10
(85 – 90]	7

i) Draw a frequency histogram and comment on its shape.

3 pts.

ii) Find the mean and standard deviation.

4 pts.

2) The following data represent the weights in pounds of a sample of 25 workers:

134	137	140	145	146	148	151	152	154	156
156	157	162	163	164	165	168	168	169	171
172	173	174	174	177					

i) Draw a stem and leaf plot, and comment on the shape of the distribution.

3 pts.

ii) Find the 80th percentile, and explain it in the context of the problem. *3 pts.*

iii) Find the standard deviation of the weight using the following information

$$\sum_{i=1}^{25} x_i = 3976, \quad \sum_{i=1}^{25} x_i^2 = 636090 \quad \text{2 pts.}$$

- 3) It is known that in a chemical process the purity of oxygen, (y), is related to the percentage hydrocarbons, (x), that are present in the main condenser. The purity of the oxygen in percents was measured in 20 hydrocarbon levels and the following regression summary information were obtained:

$$\bar{x} = 1.268 \quad \bar{y} = 11.28 \quad S_{xx} = 0.68 \quad S_{xy} = 10.18 \quad S_{yy} = 173.37$$

- i) Find the fitted regression line. *3 pts.*

- ii) How does the purity of oxygen change if hydrocarbon content drops by 10%? *2 pts.*

- iii) Compute and interpret the correlation coefficient. *2 pts.*

- 4) A manufacturer of food processors conducted an analysis of a large number of consumer complaints and found that they fell into six categories as shown in the table below.

	Reason for Complaint			Total
	Electrical	Mechanical	Appearance	
During guarantee	18%			63%
After guarantee	12%	22%		
Total	30%			

Fill in the table knowing that if a complaint is filed during guarantee period, the probability is 0.21 that the complaint was mechanical. *3 pts.*

- 5) The quality control department in a manufacturing company employs 2 engineers, Ahmad and Saad. Ahmad inspects 70% of the products, while Saad inspects the remaining 30%. The probability of Ahmad committing an error is 0.02, while that of Saad is 0.04.

i) What is the probability that an item passes by mistake? *2 pts.*

ii) If an item passed the inspection by mistake. Which engineer would you guess did the work? Explain your answer using a proper probabilistic argument, showing all your work. *3 pts.*