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

STAT 201 INTRODUCTORY STATISTICS
Semester 181, First Major Exam
Sunday Oct. 7, 2018

Serial Number

Name: _____ ID #:_____

Important Note:

- Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.
- Mobiles are not allowed in exam. If you have your mobile with you, turn it off and put it under your seat so that it is visible to proctor.
- Show all your work including formulas, intermediate steps and final answer. No points for answer without justification.
- Round up to 4 decimal points if needed.
- Make sure you have 6 unique pages of exam paper (including this title page).

Question No	Full Marks	Marks Obtained
1	10	
2	8	
3	6	
4	4	
5	4	
6	3	
Total	35	

Q1: A building contractor whose company builds many homes every year. In planning for each job, the contractor needs some ideas about the direct labor hours required to build a home. He has collected sample information on the labor hours for 12 jobs during past week.

22 3 24 12 26 14 27 32 82 50 31 61

a. Make a stem – and – leaf plot for the data. (3 *pts.*)

b. Depend on the stem – and leaf plot, examine the distribution (briefly): (3 *pts.*)

- Shape
- Modes:
- Possible outliers:

c. If the contractor had to select the mean or the median as the measure of location for direct labor hours, what factors about each should he consider before making the decision? Which measure would you suggest he use? (2 *pts.*)

d. Find the 55^{th} percentile and interpret it. (2 *pts.*)

Q2: During the laying of gas pipelines, the depth of the pipeline (in mm) must be controlled. One service provider recorded depths of

418 428 431 420 412 425 423 433 417 420 410 431 429 425

a. Compute the mean, the median, and the standard deviation. Comment on the shape. (3 *pts.*)

1. The mean:
2. The median:
3. The standard deviation:

b. Find the coefficient of variation. Interpret your answer. (2 *pts.*)

c. Measurements by another service provider have a sample mean of 425 and standard deviation of 6.36. Which provider's set of measurements has relatively more variation? Justify your answer. (3 *pts.*)

Q3: The foundation of a wall can fail either by excessive settlement or from bearing capacity. The respective failures are represented by events A and B, with probabilities $\boldsymbol{a}$, and $\boldsymbol{b}$ respectively. The probability of failure in bearing capacity given that the foundation displays excessive settlement is $\boldsymbol{\beta}$.

a. Find the probability of failure of the wall foundation. (2 *pts.*)

b. Find the probability that there is excessive settlement in the foundation but there is no failure in bearing capacity. (2 *pts.*)

c. Find the probability that the foundation has excessive settlement given that it fails in bearing capacity. (2 *pts.*)

Q4: A chemical engineer keeps repeating an experiment unless he gets the desired result with the restriction. It is estimated that the probability of getting the desired result in any experiment at a time is 0.75.

a. Write out the sample space? (2 *pts.*)

b. What is the probability that he repeats the experiment 3 times? (2 *pts.*)

Q5: Suppose that the probability that Ahmad and Mohammad will succeed in assembling the computer are 56% and 71% respectively and that the probability that both will succeed is 39%. Then compute the probability that Mohammad will not succeed in assembling the computer given that Ahmad has not succeeded in assembling the computer. (4 *pts.*)

Q6: For the events A and B, $P(B) = k$, $P(A|B) = k^2$, $P(A|\bar{B}) = 2k$, find the value of k such that the events $\bar{A}$ and $\bar{B}$ are mutually exclusive and $k < 1$. (3 *pts.*)

Formula Sheet

Descriptive Statistics

- Sample Mean $\bar{x} = \frac{\sum x_i}{n}$ or $\bar{x} = \frac{\sum x_i f_i}{n}$
- Sample Variance $s^2 = \frac{\sum x_i^2 - n\bar{x}^2}{n-1}$ or $s^2 = \frac{\sum x_i^2 f_i - n\bar{x}^2}{n-1}$
- Percentiles: $R_\alpha = \frac{(n+1)\alpha}{100}$ & $P_\alpha = X_{(i)} + d\left(X_{(i+1)} - X_{(i)}\right)$

Probability

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- $P(A|B) = \frac{P(A \cap B)}{P(B)}, P(B) > 0$
- $P\left(A_j \middle| B\right) = \frac{P(A_j \cap B)}{P(B)} = \frac{P(A_j)P\left(B \middle| A_j\right)}{\sum_{i=1}^{k} P(A_i)P(B|A_i)}$, $j = 1, 2, \dots, k$