

Kuwait University  
College of Science  
Department of Statistics and Operations Research

Stat 101  
Homework Booklet

**Fall Term 2016/2017**

Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 1

**Problem 1**

For each of the following cases, indicate whether the variable is qualitative or quantitative (specifying in the second case whether it is discrete or continuous).

- a. High school GPA of those who applied for admission to Kuwait University last Spring
- b. Entry level salary of students who graduated from Kuwait University last Fall
- c. Gender of students enrolled in all sections of Stat 101 during this semester
- d. The Major of a sample of students at the Faculty of Science
- e. Color of the cars driven by a sample of fresh students at KU

**Problem 2**

Indicate whether each of the following constitutes a population or a sample.

- a. One hundred students admitted to Kuwait University in Spring 2015
- b. All non-technical support staff currently working for Kuwait University
- c. All female students graduating from Kuwait University in spring 2015
- d. One thousand applicants for jobs advertised by Microsoft in December 2015
- e. All students enrolled in all courses offered by the College of Science of Kuwait University in Fall 2015
- f. All students who were enrolled in Stat 101 during this semester

### **Problem 3**

Indicate for each of the following the population, the sample, the variable, and its type. Provide an example of a possible observation for each case.

- a. Income of 10 physicians practicing in Kuwait City in January 2010
  
- b. Number of accidents that occurred along the 4<sup>th</sup> ring road on 15 random days of summer 2013
  
- c. Blood type of 20 Kuwait University students enrolled in Stat 101 of Summer 2013
  
- d. Number of courses already completed by 10 male students newly enrolled in the Statistics and Operations Research Department in Spring 2015
  
- e. Weight of 15 male athletes from Al-Qadesyya sports club on the day of their medical test.

### **Problem 4**

A study of the records of 300 students from the college of Social Sciences revealed that 60 persons of the sampled students were originally admitted to a different college. The University is interested in predicting the proportion of students that might transfer to the college of Social Sciences next academic year. Describe the

1. Population
  
2. Sample
  
3. Variable of interest and its type
  
4. Descriptive statistics
  
5. Inference of interest.

**Problem 5**

30 adults were asked which of the following conveniences they find essential for their lives: television (T), refrigerator (R), air conditioning (A), public transportation (P), or microwave (M). Their responses were

R	A	R	T	P	T	R	M	A	A
A	R	R	T	P	P	T	R	A	A
R	P	A	T	T	P	T	A	A	R

1. Prepare a frequency distribution. Also give the relative and percentages frequencies.
2. What percentage of these adults named refrigerator or air conditioning as the convenience that is essential for them?
3. Draw a bar graph for the relative frequency distribution.
4. Draw a pie chart for this data.



Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 2

The following data give the cost of Textbooks of a sample of 20 students for the Spring term of 2015.

21	18	33	35	46	27	41	44	28	16
15	20	24	27	26	34	23	51	32	29

1. Find the mean, median, and mode.
2. Compute the range and standard deviation.
3. Construct the Box Plot.
4. Comment on the shape of the distribution.







Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 4

**Problem 1**

Each of the following tables lists certain values of  $x$  and a function  $P(x)$ . Verify whether or not each table represents a valid probability distribution.

a.

$x$	$P(x)$
0	0.10
1	0.50
2	0.45
3	0.40

b.

$x$	$P(x)$
2	0.30
3	0.28
4	0.32
5	0.10

c.

$x$	$P(x)$
7	-0.25
8	0.85
9	0.40

d.

$x$	$P(x)$
7	0.25
8	0.60
9	0.15

**Problem 2**

A sporting shop sells exercise machines. The number ( $X$ ) of machines sold per day at this shop is a random variable with probability distribution

$x$	4	5	6	7	8	9	10
$P(x)$	0.2	0.1	0.25	0.15	0.15	0.1	0.05

- Graph the probability distribution.
- Determine the probability that the number of machines sold by this shop on a given day is
  - Exactly 6
  - More than 8
  - 5 to 8 inclusive
  - 5 to 8 exclusive
- Calculate the mean and standard deviation for this probability distribution.

### **Problem 3**

Assume that 30% of all adults feel stress in their daily lives. Let  $X$  represents the number who feel stress in a random sample of 15 adults.

1. Compute the probability that  $X$  is:
  - a. exactly 12
  - b. at most 8
  - c. at least 5
  - d. 5 to 10 inclusive
  - e. 5 to 10 exclusive
  
2. Find the mean and the variance of  $X$ .

Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 5

**Problem 1**

1. Assume that  $Z$  has the standard normal distribution. Find

a.  $P(-2.25 < Z < 1.75) =$

b.  $P(-1.59 < Z < -1.24) =$

c.  $P(Z < -1.45) =$

d.  $P(Z > 1.45) =$

e. compare the result in c and d.

2. Assume  $Z$  has the standard normal distribution. Find the value of  $C$  in the following cases

a.  $P(Z > C) = 0.1271$

b.  $P(Z < C) = 0.3707$

c.  $P(-C < Z < C) = 0.8$

3. For a normal distribution with mean  $\mu$  and variance  $\sigma^2$ , find the area between  $\mu - 2\sigma$  and  $\mu + 2\sigma$ .





Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 6

**Problem 1**

Assume that daily hotel room rates have a normal distribution with mean 50 KD and standard deviation 16 KD. Let  $\bar{X}$  be the mean charge of a random sample of 100 rooms.

1. Find the mean and standard deviation of  $\bar{X}$ .

2. Compute  $P(\bar{X} > 51)$

**Problem 2**

Assume that the daily earning of construction workers is normally distributed with mean 12 KD and standard deviation 2 KD. Find the probability that the mean daily earnings of a random sample of 16 construction workers is

1. between 10.8 KD and 13.4 KD

2. within 1 KD of the population mean









Name		ID Number		Lab Section	
------	--	-----------	--	-------------	--

Homework 9

**Problem 1**

Independent random samples selected from two normal populations with equal variances produced the following:

Population	n	$\bar{x}$	S
1	16	12	2.2
2	24	15	2.4

- a) Find and interpret the 95% confidence interval for  $(\mu_1 - \mu_2)$ .
- b) Conduct the test  $H_0: (\mu_1 - \mu_2) = 0$  against  $H_1: (\mu_1 - \mu_2) \neq 0$  with  $\alpha = 0.01$

**Problem 2**

Independent random samples selected from KU male and female students produced the following data

	Sample size n	number of married students (X)
Male	50	15
Female	100	40

- a) Find and interpret the 95% confidence interval for  $(P_M - P_F)$ .
- b) Conduct the test  $H_0: (P_M - P_F) = 0$  against  $H_1: (P_M - P_F) < 0$  with  $\alpha = 0.05$



5. Plot the regression line on the scatter diagram of part 1 and show the errors by drawing vertical lines between scatter points and the regression line.
6. Estimate the price of an 8-years old car of this model.
7. Compute the error of the above estimate.
8. Compute the coefficient of determination and give a brief interpretation of it.
9. Do you expect the ages and prices of cars to be positively or negatively related? Explain.
10. Compute the linear correlation coefficient.