

**Problem Set for Chapter 4: Numerical Descriptive Techniques  
Eco249 Statistics Queens College K. Matsuda**

**Excel Assignments (You need to hand in these.)**

**You solve the following problems using Excel and you are required to hand in the print outs (not diskette) of your report by the due Matsuda determines. You should work individually. Don't be a copy of somebody else. Originality and creativity are very important. And the way you present your thoughts matter.**

**[4.1](2 points)**

**Example 2.1 (page 31)**

In the last decade, a number of companies have been created to compete in the long-distance telephone business. As part of a larger study, one such company wanted to acquire information about the monthly bills of new subscribers in the first month after signing with the company. The company's marketing manager conducted a survey of 200 new residential subscribers wherein the first month's bills were recorded. These data are listed below and stored in file Xm02-01. The general manager planed to present his findings to senior executives. What information can be extracted from these data?

**Create the similar descriptive statistics table which appears on the page 97 of the required textbook. Refer to the page 97 of the required textbook for step by step instructions. You don't have to worry about the number of decimal places.**

**[4.2](4points)**

The consumer reports (June 2000) data on bounced-check fees charged by each in a sample of 23 U.S. metropolitan banks are stored in file 'Bankcost'.

- a. Find the mean and median for the data set.
- b. Find the range for the data set.
- c. Find the variance and standard deviation for the data set.

**[4.3](2 points)**

**Example 4.16 (page 121)**

Students who apply to MBA programs must write the Graduate Management Admission Test (GMAT). University admissions committees use the GMAT score as one of the critical indicators of how well a student is likely to perform in the MBA program. However, the GMAT may not be a very strong indicator for all MBA programs. Suppose that an MBA program designed for middle managers who wish to upgrade their skills was launched 3 years ago. To judge how well the GMAT score predicts MBA performance, a sample of 12 graduates was taken. Their grade point average in the MBA program (values from 0 to 12) and the GMAT score (values from 200 to 800) are listed in

the table below and stored in file Xm04-16. Compute the covariance and the coefficient of correlation, and interpret your findings.

GMAT and GPA Scores for 12 MBA students

GMAT	GPA
599	9.6
689	8.8
584	7.4
631	10.0
594	7.8
643	9.2
656	9.6
594	8.4
710	11.2
611	7.6
593	8.8
683	8.0

**Create the Excel output of covariance and coefficient of correlation which appears on the page 122 and 123 of the required textbook. Refer to the page 122-123 of the required textbook for step by step instructions.**

**Create the exactly the same (especially the scale of x and y axis) Excel output of trend line or least squares line which appears on the page 125 of the required textbook. Refer to the page 125 of the required textbook for step by step instructions.**

**[4.4](6 points)**

Osteoporosis is a condition wherein bone density decrease, often resulting in broken bones. Bone density usually peaks at age 30 and decreases thereafter. To understand more about the condition, a random sample of women aged 50 and over were recruited. Each woman's bone density loss and age were recorded. These data are stored in file 'Osteoporosis'.

- Compute the covariance and interpret what this tells you.
- Compute the coefficient of correlation and interpret what this tells you.
- Determine the least squares line and interpret what this tells you.

**[4.5](5 points)**

To learn more about the size of withdrawals at a banking machine, the proprietor took a sample of 75 withdrawals and stored the amounts in file 'Bank Withdrawal'.

- Calculate the mean and standard deviation of these data.
- Describe what these two statistics tell you about the withdrawal amounts.

**Exercises for Your Better Understanding (You don't have to hand in these.)**

**Exercise 4.4 on page 100 (You can find the solution on the required textbook.)**

The midterm test for a statistics course has a time limit of 1 hour. However, like most statistics exams, this one was quite easy. To assess how easy, the professor recorded the amount of time taken by a sample of nine students to hand in their test papers. The times (rounded to the nearest minute) are

- a. Compute the mean, median, and mode.
- b. What have you learned from the three statistics calculated in part a?

**Exercise 4.2 on page 100 (You can find the solution on the required textbook.)**

The number of sick days due to colds and flu last year was recorded by a sample of 15 adults. The data are

5 7 0 3 15 6 5 9 3 8 10 5 2 0 12

Compute the mean, median, and mode.

**Example 4.7 on page 104 (You can find the solution on the required textbook.)**

The following are the number of summer jobs a sample of six students applied for. Find the mean and variance of these data.

17 15 23 7 9 13

**Exercise 4.22 on page 108 (You can find the solution on the required textbook.)**

Find the variance and standard deviation of the following sample.

0 -5 -3 6 4 -4 1 -5 0 3

**Exercise 4.28 on page 108 (You can find the solution on the required textbook.)**

A set of data whose histogram is bell shaped yields a sample mean and standard deviation of 50 and 4, respectively. Approximately, what proportion of observations

- a. are between 46 and 54?
- b. are between 42 and 58?
- c. are between 38 and 62?

**Exercise 4.58 on page 126 (You can find the solution on the required textbook.)**

Attempting to analyze the relationship between advertising and sales, the owner of a furniture store recorded the monthly advertising budget (\$thousands) and the sales (\$millions) for a sample of 12 months. The data are listed here.

Advertising	23	46	60	54	28	33	25	31	36	88	90	99
Sales	9.6	11.3	12.8	9.8	8.9	12.5	12.0	11.4	12.6	13.7	14.4	15.9

- A. Calculate the covariance of the two variables.
- B. Calculate the coefficient of correlation.

- C. What do these statistics tell you about the relationship between advertising and sales?

**Exercise (You cannot find the solution on the required textbook. Compare your answer with friends.)**

Find the mean and standard deviation for the following  $n = 20$  measurements:

11, 16, 12, 12, 21, 4, 13, 10, 17, 12, 15, 12, 9, 11, 14, 13, 12, 15, 10, 16

- a. Construct the intervals  $\bar{x} \pm s$ ,  $\bar{x} \pm 2s$ ,  $\bar{x} \pm 3s$ .
- b. Count the number of observations falling within each interval and find the corresponding proportions. Compare your results to the Empirical Rule and Chebysheff's Theorem.

**For further exercises refer to Chapter 4 of the textbook.**