STATISTICS FOR MANAGEMENTS (IDS 570)

HOMEWORK 1
DUE DATE: THURSDAY, SEPTEMBER 11

The goal of this assignment is to review the descriptive statistics (graphs and numbers) and to get comfortable with using the R software. Therefore you are required to draw the plots in R. Please include the code you use along with the plots. All the calculations and formulas should also be inculded. You can find all data in the excel file "Assignment 1 excel file" on blackboard. You need to submit a PDF or a word file.

Problem 1. *Foreign Affairs* magazine conducted a survey to develop a profile of its subscribers. The following questions were asked.

(a) How many nights have you stayed in a hotel in the past 12 months?
(b) Where do you purchase the books? Three options were listed: Bookstore, Internet, and Book Club.
(c) Do you own or lease a luxury vehicle? (Yes or NO)
(d) What is your age?
(e) For foreign trips taken in the past three years, what was your destination? Seven international destinations were listed.

Comment on whether each question provides categorical or quantitative data.

Problem 2. Money magazine listed top career opportunities for work that is enjoyable, pays well, and will be around in 10 years from now. Shown below are 20 top career opportunities, with the median pay and top pay for workers with two to seven years of experience in the field. Data are show in thousands of dollars.

Career	**Median Pay**	**Top Pay**
Account Executive	81	157
Certified Public Accountant	74	138
Computer Security Consultant	100	138
Director of Communications	78	135
Financial Analyst	80	109
Finance Director	121	214
Financial Research Analyst	66	155
Hotel General Manager	77	146
Human Resources Manager	72	111
Investment Banking	106	221
IT Business Analyst	83	119
IT Project Manager	99	140
Marketing Manager	77	126
Quality-Assurance Manager	80	122
Sales Representative	67	125
Senior Internal Auditor	76	106
Software Developer	79	116
Software Program Manager	110	152
Systems Engineer	87	130
Technical Writer	67	100

Develop a stem-and-leaf display for both the median pay and the stop pay. Comment on what you learn about the pay of these careers.

Problem 3. In Yale class, the 45 students have been averaging just 72% on their tests, so they have decided to do something very bad: cheat on the final exam. They've stolen a copy of the test and memorized all the answers. For 23 of the students, however, justice was swift. They accidentally got last year's copy of the test and each of them failed with a 50%. The rest of the students successfully got 100%. In UIC's class, the students were honest. Their scores approximated a normal distribution with a mean of 75%.

(a) Is mean score in Yale's class smaller than the median? Explian.
(b) Is mean score in UIC's class greater than the median? Explain.
(c) Is it correct to say the standard deviation for scores in Yale's class is equal to the standard deviation for UIC's class? Explain.

Problem 4. During the 2007-2008 NCAA college basketball season, men's basketball teams attempted an all-time-high number of 3-point shots, averaging 19.07 shots per game. In an attempt to discourage so many 3-point shots and encourage more inside play, the NCAA rules committee moved the 3-point line back from 19 feet, 9 inches to 20 feet, 9 inches at the beginning of the 2008-2009 basketball season. Shown in the following table are the 3-point shots taken and the 3-point shots made for a sample of 19 NCAA basketball games during the 2008-2009 season.

3-Point Shots	Shots Made	3-Point Shots	Shots Made
23	4	17	7
20	6	19	10
17	5	22	7
18	8	25	11
13	4	15	6
16	4	10	5
8	5	11	3
19	8	25	8
28	5	23	7
21	7		

(a) What is the mean number of 3-point shots taken per game?
(b) What is the mean number of 3-point shots made per game?
(c) Using the closer 3-point line, players were making 35.2% of their shots. What percentage of shots were players making from the new 3-point line?
(d) What was the impact of the NCAA rules change that moved the 3-point line back to 20 feet, 9 inches for the 2008-2009 season? Would you agree with the Associated Press Sports article that stated, "Moving back the 3-point line hasn't changed the game dramatically"? Explain.

Problem 5. Endowment income is a critical part of the annual budgets at colleges and universities. A study by the National Association of College and University Business Officers reported that the 435 colleges and universities surveyed held a total of $413 billion in endowments. The 10 wealthiest universities are shown below. Amounts are in billions of dollars.

(a) What is the mean endowment for these universities ?
(b) What is the median endowment?
(c) What is the mode endowment?
(d) Compute the first and third quartiles.
(e) What is the total endowment at thee 10 universities? These universities represent 2.3% of the 435 colleges and universities surveyed. What percentage of the total $413 billion in endowments is held by these 10 universities?

University	Endowment($ billion)	University	Endowment($ billion)
Columbia	7.2	Princeton	16.4
Harvard	36.6	Stanford	17.2
M.I.T	10.1	Texas	16.1
Michigan	7.6	Texas A&M	6.7
Northwestern	7.2	Yale	22.9

Problem 6. Consumer Reports provided overall customer satisfaction scores for AT& T, Sprint and T-Mobile and Verizon cell-phone services in major metropolitan areas throughout the US. The rating for each service reflects the overall customer satisfaction considering a variety of factors such as cost, connectivity problems, dropped calls, static inference, and customer support. A satisfaction scale from 0 to 100 was used, with 0 indicating completely dissatisfied and 100 indicating completely satisfied. The rating for the four cell-phone services in 20 metropolitan areas are as shown.

Metropolitan Area	AT& T	Sprint	T-Mobile	Verizon
Atlanta	70	66	71	79
Boston	69	64	74	76
Chicago	71	65	70	77
Dallas	75	65	74	78
Denver	71	67	73	77
Detroit	73	65	77	79
Jacksonville	73	64	75	81
Las Vegas	72	68	74	81
Los Angeles	66	65	68	78
Miami	68	69	73	80
Minneapolis	68	66	75	77
Philadelphia	72	66	71	78
Phoenix	68	66	76	81
San Antonio	75	65	75	80
San Diego	69	68	72	79
San Francisco	66	69	73	75
Seattle	68	67	74	77
St. Louis	74	66	74	79
Tampa	73	63	73	79
Washington	72	68	71	76

(a) Consider T-Mobile first. What is the median rating?
(b) Develop a five-number summary for the T-Mobile service.
(c) Are there any outliers for T-Mobile? Explain.
(d) Repeat parts (b) and (c) for the other three cell-phone services.
(e) Show the box plots for the four cell-phone services on one graph. Discuss what a comparison of the box plots tells about the four services.

Problem 7. Please solve part (a) and (b) separately.

(a) Suppose the data has a symmetric bell-shaped distribution with a mean of 30 and standard deviation of 5. Use the empirical rule to determine the percentage of data within each of the following ranges:
  - 20 to 40
  - 15 to 45

(b) Scores on a marketing test follow approximately the N(1000, 210) distribution. What proportion of all students has scores of at most 820?

Problem 8. The Dow Jones Industrial Average (DJIA) underwent one of its infrequent reshufflings of companies when General Motors and Citigroup were replaced by Cisco Systems and Travelers. At the time, the prices per share for the 30 companies in the DJIA were as follows:

Company	**$/Share**	**Company**	**$/Share**
3M	61	IBM	107
Alcoa	11	Intel	16
American Express	25	JPMorgan Chase	35
AT&T	24	Johnson & Johnson	56
Bank of America	12	Kraft Foods	27
Boeing	52	McDonald's	59
Caterpillar	38	Merck	26
Chevron	69	Microsoft	22
Cisco Systems	20	Pfizer	14
Coca-Cola	49	Proctor & Gamble	53
DuPont	27	Travelers	43
ExxonMobil	72	United Technologies	56
General Electric	14	Verizon	29
Hewlett-Packard	37	Walmart Stores	51
Home Depot	24	Walt Disney	25

(a) What is the highest price per share? What is the lowest price per share?
(b) Using a class width of 10, develop a frequency distribution for the data.
(c) Prepare a histogram. Interpret the histogram, including a discussion of the general shape of the histogram, the midprice range, and the most frequent price range.