

The University of Illinois at Chicago IDS 531: Statistics

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The path to answers is as important as getting the final number right. Please show how each answer was computed.

Assignment 1: Descriptive Statistics, Chapters 1-3

1. Question 1.49 on page 26
2. Question 2.73 on page 142
3. The 49 students in a class rated the instructor on a scale from 1 (poor) to 5 (excellent). The results are shown in the table.

Rating	1	2	3	4	5
# Students	0	1	8	25	15

- a. Find the mean rating.
 - b. Find the median of these ratings.
 - c. What is the modal rating?
 - d. Find the variance and standard deviation for this population of ratings.
4. The following table gives the anticipated 1-year rates of return from a certain investment and their associated probabilities.

Rate/Return on X, %	Probability
-30	0.1
-10	0.30
10	0.325
25	0.2
50	0.075

- a. Calculate the expected rate of return $E(X)$. It is convenient to leave the rates of return in % form, not decimals.
- b. Calculate the variance $E[(X - \mu)^2]$ and standard deviation, (σ) of the returns.

- c. Skewness is measured by the expected value of the cube of the difference from the mean, or by $E[(X - \mu)^3]$. We will check the skewness of the distribution of the rates of return given in the table above. Is the distribution of returns in the present example positively skewed or negatively skewed? Use the sign of the 3rd moment to tell. The skewness S statistic is the square of the 3rd moment divided by the cube of the variance. Calculate S.
- e. Kurtosis is measured by the expected value of the fourth power of the difference from the mean, the fourth moment, $E[(X - \mu)^4]$. Calculate the fourth moment in the present example. The kurtosis K statistic is the fourth moment divided by the squared variance. It will be 3 for the normal distribution. Calculate K.
5. In an article on the front page of the Metro section of the August 31, 1998 *Chicago Tribune*, reporter Jon Hilkevitch states that "nationally, the homicide rate for cabdrivers is 60 times larger than the average for all other occupations, according to the National Institute for Occupational Safety and Health." Discuss the information provided by this statistic. Do you need more information? If so, what?

Assignment 2: Normal Distribution and Sampling Distributions, Chapter 6

1. (Normal Distribution) Let the random variable Z follow a standard normal distribution.
- Find $P(Z < 1.3)$
 - Find $P(Z > 1.9)$
 - Find $P(Z < -1.67)$
 - Find $P(Z > -3.1)$
 - Find $P(1.3 < Z < 1.9)$
 - Find $P(-1.67 < Z < 1.3)$
 - Find $P(-1.67 < Z < 3.1)$
2. Assume that amounts of money spent on vacation trips in a spring break by students on a particular campus follow a normal distribution with mean \$2400 and standard deviation \$500.
- What is the probability that a randomly chosen student will spend less than \$2000 on a spring break trip?
 - What is the probability that a randomly chosen student will spend more than \$2800 on a spring break trip?
 - Draw a graph to illustrate why the answers to parts (a) and (b) are the same.
 - What is the probability that a randomly chosen student will spend between \$2000 and \$3000 in a spring break trip?

- e. You want to find a range of dollar spending on spring break trips that includes 90% of all students on campus. Explain why any number of such ranges could be found, and find the shortest one.
3. Question 6.33 on page 398
4. Question 6.35 on page 398

Assignment 3: Hypothesis Testing and Confidence Intervals, Chapters 7-9

1. Question 7.71 on pages 472-473
2. Question 8.85 on page 535
3. Question 8.87 on page 535
4. Question 9.65 on page 597

Assignment 4: Linear Regression and Correlation, Chapters 13-14

Project proposal (2 sentences: I will study the question _____ . I will get my data from _____.) will be due August 2.

Each person must choose a unique problem. For example, only one person may do a CAPM model of IBM stock prices from July-August 2000. But another person might do a CAPM model of Compaq prices over the same period, or a model of IBM prices over a different period.

1. **Find** an econometric problem. Define the problem, identify the appropriate regression, and collect the data for the regression. Sources can be
 - a. **The Internet.** For example: What is the market price for homes in a given neighborhood/town? Data on prices and characteristics of comparable houses or apartments at a point in time may be available from the Multiple Listing Service. Statistical tables from FRED or the *Economic Report of the President* or the *Statistical Abstract of the United States* are fine. **But do not use prepared datasets, such as problems and data from other classes.**
 - b. **Survey.** What determines recent purchasing decisions? Survey friends or class members.
 - c. **Library.** The UN, private and government business and economics publications are full of data. Compare money-price level relationships for different countries with the International Financial Statistics.
 - d. **Newspapers.** Daily stock prices, weekly money supply, and other data are

reported. Do movements in overall stock prices explain most of the movements in XYZ stock over a month? Does CAPM explain changes in IBM's stock price?

2. **Identify** your original source. Provide reference information such as internet address, book source and page information, etc.
3. **Run the regression. Interpret and evaluate it.** What are your results? Are they what you expected?