

Pre-session. Summer 2016.

FINAL REVIEW

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**Final Exam: 50—80 points, < 60 questions, multiple-choice questions, matching question, writing questions (50%—70%). Time allowed: 120 minutes (2 hours).**

**Content covers: (please see more detail and restriction by announcements on the website)**

Part 1. Descriptive Statistics

Review questions in Quiz 1, Test 1, and lecture note 1, 2 exercises.

Part 2. Probability Theory

Review questions in Test 1, and lecture note 3, 4 exercises

Part 3. Discrete Probability Distribution

Review questions in Quiz 2, Test 2, and lecture note 5 exercises

Part 4. Continuous Probability Distribution

Review questions in Quiz 2, Test 2, and lecture note 6 exercises

Part 5. Statistical Inferences

Review questions in lecture notes 7, 8, 9 exercises and below.

1. Ten percent of the items produced by a machine are defective. A random sample of 100 items is selected and checked for defects.

- What is the sampling distribution of the sample proportion?
- What is the probability that the sample will contain more than 2.5% defective units?
- What is the probability that the sample will contain more than 13% defective units?

2. A simple random sample of 8 employees of a corporation provided the following information.

Employee	1	2	3	4	5	6	7	8
Age	25	32	26	40	50	54	22	23
Gender	M	M	M	M	F	M	M	F

- Determine the point estimate for the average age of all employees.
- What is the point estimate for the standard deviation of the population?
- Determine a point estimate for the proportion of all employees who are female.

3. The life expectancy in the United States is 75 with a standard deviation of 7 years. A random sample of 49 individuals is selected.
  - a. What is the probability that the sample mean will be larger than 77 years?
  - b. What is the probability that the sample mean will be less than 72.7 years?
  - c. What is the probability that the sample mean will be between 73.5 and 76 years?
  - d. What is the probability that the sample mean will be between 72 and 74 years?
  - e. What is the probability that the sample mean will be larger than 73.46 years?
  
4. People end up tossing 12% of what they buy at the grocery store (Reader's Digest, March 2009). Assume this is the true population proportion and that you plan to take a sample survey of 540 grocery shoppers to further investigate their behavior.
  - a. Show the sampling distribution of the proportion of groceries, thrown out by your sample respondents.
  - b. What is the approximate probability that your survey will provide a sample proportion between 9% and 15%?
  - c. What is the probability that your survey will provide a sample proportion within  $\pm 0.15$  of the population proportion?
  
5. A sample survey of 54 discount brokers showed that the mean price charged for a trade of 100 shares at \$50 per share was \$33.77 (AII Journal, February 2006). The survey is conducted annually. A manager believes that the mean price of shares is going to increase to \$60 next year. With the historical data available, assume a known population standard deviation is \$15.
  - a. Develop a 95% confidence interval estimate of the mean price charged by discount brokers for a trade of 100 shares at \$50 per share

Now you want to test the manager's conjecture at the significant level of 5%

- b. State the null and alternative hypotheses to test the manager's conjecture.
  - c. Calculate the test statistic.
  - d. Test the hypothesis using the critical value approach.
  - e. Test the hypothesis using the p-value approach.
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6. A survey conducted by the American Automobile Association showed that a family of four spends an average of \$215.60 per day while on vacation. Suppose a sample of 64 families of four vacationing at Niagara Falls resulted in a sample mean of \$252.45 per day and a sample standard deviation of \$74.50.
    - a. State the null and alternative hypotheses to test the the conclusion of the survey.
    - b. Calculate the test statistic.
    - c. Use the critical value approach to test the hypotheses at the 5% level of significance.
    - d. Use the critical value approach to test the hypotheses at the 1% significant level.