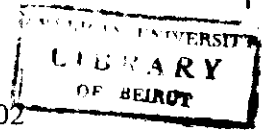


Time: 2 hours

June 13, 2002



**MATH 207**  
**Final Exam**  
**Second Semester, 01-02**

**Instruction: Give answers correct to 2 decimal places.**

1. For six weeks, a manager recorded the number of radio ads aired per week and the amount of sales (in thousands of dollars) of a certain product. The data for the sample follow.

<b>Number of ads</b> $x$	2	5	8	8	10	12
<b>Sales</b> $y$	\$2	\$4	\$7	\$6	\$9	\$10

- a) Find the regression equation for the data.
  - b) Use the equation found in (a) to predict the value of sales when  $x = 7$  ads.
2. The mean time it takes adults to complete a certain achievement test is 46.2 minutes with a standard deviation of 8 minutes. Assume the variable is normally distributed.
- a) Find the probability that a randomly selected adult will complete the test in less than 43 minutes.
  - b) If a randomly selected sample of 49 adults take the test, find the probability that the mean time it takes the sample to complete the test will be less than 43 minutes.
  - c) Compare the probabilities found in (a) and (b) and comment.
3. The amounts of telephone bills for all households in a large city have a distribution that is skewed to the right with a mean of \$70 and a standard deviation of \$25. Let  $\bar{x}$  be the mean amount of telephone bills for a random sample of 90 households selected from this city.
- a) Calculate the mean and standard deviation of  $\bar{x}$  and describe the shape of its probability distribution.
  - b) What is the probability that the value of  $\bar{x}$  lie within \$2 of the population mean?
4. The standard deviation for a population is 6.3. Its unknown mean is  $\mu$ . A random sample of size  $n$ , selected from this population gave a mean equal to 78.9.
- a) Construct a 95% confidence interval for  $\mu$ , and give the width of the interval, in each of the following cases:
    - (i)  $n = 36$
    - (ii)  $n = 81$
    - (iii)  $n = 100$
  - b) Does the width of the confidence intervals constructed in part (a) increase or decrease as the sample size increases? Why?



5. A random sample of 25 families selected from an area showed that they spend an average of \$120 per month on health care with a sample standard deviation of \$28. Construct a 99% confidence interval for the mean health care expenditure per month incurred by all families in this area. Assume the monthly health care expenditures of all families in this area have a normal distribution.

6.  $H_0: \mu = 40$ ,  $H_a: \mu \neq 40$ ,  $n = 64$ ,  $\bar{x} = 38.4$ ,  $\sigma = 6$ ,  $\alpha = 0.05$

- a) Perform the above hypothesis test.
- b) According to the result of the test in (a), what type of error might have occurred? Why?

7. The average SAT score in mathematics is 483, with a standard deviation of 100. A special preparation course claims that it can increase scores. A sample of 32 students completed the course and the mean of their scores was 503.

- a) At significance level  $\alpha = 0.05$ , does the course do what it claims? Perform the appropriate hypothesis test.
- b) According to the result of the test in (a), what type of error might have occurred? Why?