Statistics 13

Sample

FINAL

Instructions: 1. **WORK ALL PROBLEMS.** Please, give details and explanations and **SHOW ALL YOUR WORK** so that partial credits can be given.

2. You may use three pages of notes, tables and a calculator but no other reference materials.

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**Points**

1. An insurance company is trying to estimate the average number of sick days that full-time service workers use per year. A pilot study found the standard deviation to be 2.1 days. How large the sample must be selected if the company wants to be 99% sure of getting a confidence interval which covers the true value of the mean with a margin of error of 1 day? Explain which assumptions you used in the calculation of this sample size.

(15)

2. The data given below are the shoe sizes (x) and the weights (y) of nine college males:

   x: 9.5 9.5 10.5 11 8.5 8.5 9.5 10 9
   y: 140 155 150 180 160 155 145 163 150

   a. Obtain the estimated least-squares regression equation, and explain the meaning of the estimated slope in the context of this problem.
   b. Plot the estimated regression function and the data. Does a linear function appear to give a good fit here?
   a. Test the null hypothesis that the regression slope is equal to zero versus the alternative hypothesis that the regression slope is positive at 0.01 level of significance and find the p-value.
   d. Find the a 95% confidence interval for the mean weight when the shoe size is 10.

(35)

3. Meteorologists classify storms as either single or multiple peak. The total number of lightning flashes was recorded for seven single-peak and five multiple-peak storms, resulting in the following data:

   Single-peak: 101 53 40 40 80 66 75
   Multiple-peak: 227 201 245 239 208

Does the data suggest that the true mean number of lightning flashes differs for the two types of storms?

   a. State the null and alternative hypotheses.
   b. Test at 0.01 level of significance. What assumptions are you making in this hypothesis testing.
   c. Find the p-value.

(25)
4. An exercise physiologist measured the heart rate of 10 randomly selected people. The
subjects were then placed on a running program to see if exercise makes any
difference in terms of heart rate. One year later their heart rates were measured again.
The results are as follows:

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a. State the null and alternative hypotheses.
b. Test at .05 level of significance.
c. Find a 95% confidence interval for the difference.
d. Compare the results of parts b and c and discuss.