

College of the Redwoods  
Mathematics Department

Elementary Statistics — Math 15  
Extra Credit Quiz #7

## Quiz Questions

**Instructions.** Place the solution to each of the following questions on your own paper. You must show all of your work to receive credit for your solution. Staple the quiz to your solutions before submitting your quiz.

EXERCISE 1. Prior to the 1999-2000 season in the National Basketball Association, the league made several rule changes designed to increase scoring. The average number of points scored per game in the previous season had been 183.2. Statisticians believed that the rule changes increased the average number of points per game in the 1999-2000 season. Data from 25 games in the 1999-2000 season follow:

196	198	205	163	184
224	206	190	140	204
200	190	195	180	200
180	198	243	235	200
188	197	191	194	196

- (a) State the null and alternative hypothesis.
- (b) State the direction of extreme.
- (c) Use your calculator to determine the observed statistic.
- (d) Calculate the  $p$ -value of the test. *Note: no credit will be given for a correct  $p$ -value with no supporting work. First, state the definition of the  $p$ -value as I do on each problem in class. Interpret the phrases in the definition. Calculate a  $t$ -statistic, then use the `tcdf` function to determine the  $p$ -value. Your work should be accompanied with a carefully labeled graph of the distribution of  $\bar{X}$  as well as a graph of the  $t$ -distribution, each having a shaded region representing the  $p$ -value.*
- (e) State your decision at the  $\alpha = 0.05$  significance level.

EXERCISE 2. To study the metabolism of insects, researchers fed cockroaches measured amounts of a sugar solution. After 10 hours, 5 roaches fed a sugar D-glucose solution were dissected. Researchers found the following amounts (in micrograms) of D-glucose in their hindguts:

55.95   68.24   52.73   21.50   23.78

You are to find a 95% confidence interval for the mean amount of D-glucose in cockroach hindguts.

- (a) Use 1-Var Stats to identify the sample mean and deviation.
- (b) Use a table to find the value of  $t^*$ .
- (c) Write down the formula for the confidence interval and substitute appropriate values.
- (d) Compute the margin of error.
- (e) State the 95% confidence interval.

**Solutions to Exercises****Exercise 1(a)**  $H_0 : \mu = 183.2, H_1 : \mu > 183.2$ **Exercise 1(b)** To the right.**Exercise 1(c)**  $\bar{x} = 195.88, S = 20.271, n = 25$ **Exercise 1(d)**  $p$ -value = 0.0022869**Exercise 1(e)** Reject the null hypothesis.**Exercise 2(a)**  $\bar{x} = 44.44, s = 20.740, n = 5$ **Exercise 2(b)**  $t^* = 2.776$ **Exercise 2(c)**  $\bar{x} + t^* \frac{s}{\sqrt{n}} = 44.44 + 2.776 \frac{20.740}{\sqrt{5}}$ **Exercise 2(d)** 25.747**Exercise 2(e)** (18.693, 70.187)