

# ICMA151 Statistics for Science I

Name: \_\_\_\_\_ ID: \_\_\_\_\_

## Quiz 5 (5%) 5 Problems (10 points each)

### Problem

1. A garment manufacturing company recorded the amount of time that it took to make a pair of jeans on 8 different occasions. The times in minutes are as follows:

12.5, 13.0, 11.9, 10.2, 13.1, 13.6, 13.8, and 14.0.

Assume these measurements were taken from a population with a normal distribution. It is of interest to know if the sample data suggest that the average time it takes this company to make a pair of jeans is less than 13.5 minutes. Does the sample data support the alternative hypothesis at the  $\alpha = 0.05$  level?

Test statistic = \_\_\_\_\_

Critical Value(s) = \_\_\_\_\_

Conclusion: \_\_\_\_\_

Interpretation: The average time it takes this company to make a pair of jeans \_\_\_\_\_ less than 13.5 minutes.

Construct a 95% confidence interval for the mean amount of time it takes this company to make a pair of jeans.

\_\_\_\_\_

2. Here are the red blood cell counts (in 10<sup>6</sup> cells per microliter) of a healthy person measured on each of 15 days:

5.6 5.4 5.2 5.4 5.7 5.5 5.6 5.4 5.3 5.5 5.5 5.1 5.6 5.4 5.4

Find a 95% confidence interval estimate of the true mean red blood cell count for this person during the period of testing.

What is 95% confidence interval? (CI)

CI = \_\_\_\_\_ Enter (n1, n2)

3. A customer service representative was interested in comparing the average time (in minutes) customers are placed on hold when calling Southern California Edison and Southern California Gas companies. The representative obtained two independent random samples and calculated the following summary information:

	Southern Cal Edison	Southern Cal Gas
Sample Size	9	12
Sample Mean	3.2 min	2.8 min
Sample Standard deviation	0.5 min	0.7 min

Assume the distributions of time a customer is on hold are approximately normal. Is it reasonable to assume equality of variances in this problem? Test whether there is a significant difference in average time a customer is on hold between the two companies.

Calculate the value of the test statistic. Set up the appropriate rejection region for the test in part (a) assuming  $\alpha = 0.10$ .

What is the appropriate conclusion?

Test Statistic = \_\_\_\_\_

Reject Region: Reject  $H_0$  if  $|t| > \underline{\hspace{2cm}}$

Conclusion: \_\_\_\_\_

One \_\_\_\_\_ conclude that there is a significant difference in mean time a customer is on hold between the two companies.

4. A researcher believes she has designed a keyboard that is more efficient to use than a standard keyboard. In order to help decide if this is the case, typing speeds were taken for 8 different people on each keyboard. The lengths of time, in minutes, for each of the people to type a pre-selected manuscript are listed below.

Person	Original	New
1	15	12
2	9	8
3	17	15
4	10	8
5	9	5
6	4	4
7	30	25
8	29	21

Assume the two population distributions are normal. Use the data to determine if the original keyboard yields slower times. Use a significance level of  $\alpha = 0.05$ .

Test Statistic = \_\_\_\_\_

Reject Region: Reject  $H_0$  if  $|t| > \underline{\hspace{2cm}}$

Conclusion: \_\_\_\_\_

The original keyboard \_\_\_\_\_.

5. A marketing research professor at a university conducted a survey to determine whether mode of transportation to the university and the person's position at the university were independent. The following data was recorded:

<i>Position</i>	Walk	Bike	Automobile	Other
Faculty	19	28	75	45
Staff	14	20	63	70
Students	27	49	88	67

Perform the appropriate test of hypothesis using  $\alpha = 0.10$ .

Compute  $X^2 =$  \_\_\_\_\_

Reject  $H_o$  when  $X^2 >$  \_\_\_\_\_.

Conclude that the mode of transportation to the university and person's position at the university are \_\_\_\_\_.