**COURSE: DSCI 3710** **Print Name:**

**Final Exam, Version A** **Signature:**

**Fall, 2006** **S.I.D.#:**

***Instructions:***

- Please print your name, Student ID number, and seat number on this exam. Also, put your signature on this exam.
- Please **PRINT** your name and your Student ID number, and the above Exam. Version on your scantron. To better protect your privacy also print your name on the back side of your scantron.
- The exam has 30 questions, and you have 100 minutes to complete it. The exam is open book, open notes, and open mind. You may use any type of calculator, but please show all your work on this exam and **properly mark all answers on the scantron**.
- Many of the questions follow the format of those in HLS modules. Others are either based on the Excel assignments done for the course, or use an HLS -like approach with problems similar to those assigned as homework from the text.
- Please **DO NOT DETACH** this exam. When you have completed the exam, please insert completed scantron into the exam booklet and turn them (both) in to your instructor, at the front desk.
- No cheating.
- Good luck and we wish you well on the exam.

**Note:**
**Whenever question(s) are connected you may be asked to assume a result (given a value) for some previous question/s; but this result may or may not be correct. The process is to prevent you from losing points on subsequent question/s because you made a mistake on some previous question/s.**

**Use the information given below to answer the four (4) questions that follow:**

The Glen Valley Steel Company manufactures steel bars. If the production process is working properly, it turns out steel bars with an average length of at least 2.85 feet with a standard deviation of 0.20 foot (as determined from engineering specifications on the production equipment involved). Longer steel bars can be used or altered, but shorter bars must be scrapped. A sample of 25 bars is selected from the production line. The sample indicates an average length of 2.70 feet. The company wishes to determine whether the process is making short bars because if it is, then the production equipment needs an immediate adjustment.

1. State the null and alternative hypothesis.
   A. Ho: $\mu \geq 2.85$; Ha: $\mu < 2.85$ *
   B. Ho: $\mu < 2.85$; Ha: $\mu \geq 2.85$
   C. Ho: $\mu \geq 2.85$; Ha: $\mu \neq 2.85$
   D. Ho: $\mu = 2.85$; Ha: $\mu \neq 2.85$
   E. Ho: $\mu \geq 2.85$; Ha: $\mu = 2.85$

2. At the 5% level of significance, where is the Reject Ho region?
   A. To the left of Z = -1.645 *
   B. To the left of Z = -1.645 and to the right of Z = 1.645
   C. To the left of t = -1.328 and to the right of t = 1.328
   D. To the right of Z = 1.960
   E. To the left of Z = -1.960

3. Assuming the calculated value of the test statistic is -1.05, what are the decision and conclusion of the test at the significance level of 0.05?
   A. Fail to reject the null hypothesis, there is sufficient evidence to conclude that the process is not making short bars.
   B. Reject the null hypothesis, there is sufficient evidence to conclude that the process is not making short bars.
   C. Fail to reject the null hypothesis, there is insufficient evidence to conclude that the process is making short bars.*
   D. Reject the null hypothesis, there is insufficient evidence to conclude that the process is not making short bars.
   E. Reject the alternative hypothesis, conclude the mean is significantly less than 2.8 feet.

4. If the computed value of the test statistic is -1.96, what is the p-value?
   A. 0.0145
   B. 0.4909
   C. 0.7188
   D. 0.0091
   E. 0.025*

**Use the information given below to answer the three questions (3) that follow:**

In competing for voice over internet phone customers both Vonage and SunRocket (one of their competitors) claim to have the best rates for international calls. A consumer decided to test the claims by collecting and analyzing data for the price to call the same countries, from their Web sites. The rates offered by each company, in cents per minute, for international calls from the U.S. to 13 randomly selected countries and their statistical analysis are listed below. Is the data sufficient to show that the companies charge different mean rates?

| Country | Vonage | SunRocket |
|---|---|---|
| Argentina | 17 | 17 |
| Brazil | 15 | 19 |
| Canada | 3 | 2 |
| China | 14 | 13 |
| France | 10 | 6 |
| Germany | 11 | 5 |
| Greece | 12 | 16.3 |
| India | 31 | 55 |
| Israel | 13 | 9 |
| Italy | 11 | 4 |
| Japan | 13 | 7 |
| Korea | 10 | 7 |
| Mexico | 9 | 17 |

t-Test: Paired Two Sample for Means

| | *Vonage* | *SunRocket* | |
|---|---|---|---|
| Mean | 13 | 13.63846154 | |
| Variance | 40.66666667 | 186.7158974 | |
| Observations | 13 | | 13 |
| Pearson Correlation | 0.906316107 | | |
| Hypothesized Mean Difference | 0 | | |
| df | xxxxx | | |
| t Stat | -0.27626433 | | |
| P(T<=t) one-tail | 0.393522747 | | |
| t Critical one-tail | xxxxx | | |
| P(T<=t) two-tail | 0.787045493 | | |
| t Critical two-tail | xxxxx | | |

t-Test: Paired Two Sample for Means

| | Vonage | SunRocket |
|---|---|---|
| Mean | 13.25 | 14.19 |
| Variance | 43.48 | 199.35 |
| Observations | 13 | 13 |
| Pearson Correlation | 0.904 | |
| Hypothesized Mean Difference | 0 | |
| df | xxxxx | |
| t Stat | -0.378 | |
| P(T<=t) one-tail | 0.356 | |
| t Critical one-tail | xxxxx | |
| P(T<=t) two-tail | 0.712 | |
| t Critical two-tail | xxxxx | |

5. What are the decision and conclusion using a **dependent** samples t-test if the test is conducted at the **10% significance level**?

A. Reject the null hypothesis because p-value is greater than the significance level.
B. Fail to reject the null hypothesis, conclude the true mean rates are different.
C. Reject the null hypothesis, conclude mean rates are different.
D. Fail to reject the null hypothesis, conclude there is insufficient evidence that the mean rates are different. *
E. Reject the null hypothesis because p-value is less than the critical t.

6. How many degrees of freedom do we have in the distribution of the test statistic?

A. 11 B. 12* C. 24 D. 22 E. 28