BUS 3613, Business Statistics  
Spring 2010, Quiz 3

There are questions on both sides.

Instructions: This is a closed book, closed note quiz, and should be your work only. You may use your calculator and the provided tables and formulas. In order to get full credit you must show your work or indicate what you have entered into your calculator.

1. According to the University of Nevada Center for Logistics Management, 99% of all merchandise sold in the United States gets returned. A Houston department store sampled 90 items sold in January and found that 15 of the items were returned.

\[ \hat{p} = \frac{15}{90} \]

\[ p = 0.1667 \]

\[ x = 15 \]

a. Write down the null and alternative hypothesis to test whether or not the proportion of returns at the Houston store significantly different from the returns for the nation as a whole.

\[ H_0: \rho = 0.09 \]

\[ H_a: \rho \neq 0.09 \]

b. Find the test statistic and \( p \)-value.

By hand

\[ z = \frac{167 - 0.09}{\sqrt{0.09(1-0.09)/90}} = 2.55 \]

\[ \text{Table value} = 0.9946 \]

\[ 15/90 = 0.167 \]

\[ p = 0.108 \]

Calculator: Choose 1-Prop Z Test

\[ z = 2.54 \]

\[ p = 0.0110 \]

c. If \( \alpha = 0.05 \), what should your conclusion be? Write out your answer in a complete sentence in the context of this example.

\[ \text{Reject the null hypothesis.} \]

\[ \text{We have enough evidence to conclude that the proportion of returned items is different for Houston.} \]
2. You wish to study whether or not staff nurses in Tampa are paid significantly less than staff nurses in Dallas. A study of 60 staff nurses in Tampa and 56 staff nurses in Dallas is conducted with the following results.

<table>
<thead>
<tr>
<th>Tampa</th>
<th>Dallas</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n_1 = 60$</td>
<td>$n_2 = 56$</td>
</tr>
<tr>
<td>$\bar{x}_1 = $57,000</td>
<td>$\bar{x}_2 = $58,100</td>
</tr>
<tr>
<td>$s_1 = $6,000</td>
<td>$s_2 = $6,200</td>
</tr>
</tbody>
</table>

a. Formulate the null and alternative hypotheses for this study.

$H_0: \mu_1 \geq \mu_2$

$H_a: \mu_1 < \mu_2$

$\mu_1 =$ mean salary for nurses in Tampa

$\mu_2 =$ mean salary for nurses in Dallas

b. Find the test statistic and $p$-value. You may use the fact that the degrees of freedom are 112.818 if you are using the tables.

By hand

$$t = \frac{57,000 - 58,100}{\sqrt{6000^2/60 + 6200^2/56}} = -0.9698$$

Use $t = 0.9698$

Use $t$ row on table: $0.10 < p < 0.20$

Calculator

2 sample $t$

$t = -0.9698$

$p = 0.1671$

c. If $\alpha = 0.01$, what should your conclusion be? Write out your answer in a complete sentence in the context of this example.

Fail to reject null hypothesis.

There is no evidence to conclude that Nurses in Tampa on average are paid less than Nurses in Dallas.