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, 8% of all merchandise sold in the United States gets returned. A Houston department store sampled 85 items sold in January and found that 12 of the items were returned.

   \( \bar{p} = \frac{12}{85} = 0.14118 \)

   \( n = 85 \)

   \( x = 12 \)

   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.

   \[ H_0: p = 0.08 \]
   \[ H_a: p \neq 0.08 \]

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

   By hand
   \[ Z = \frac{0.14118 - 0.08}{\sqrt{\frac{0.08(1-0.08)}{85}}} = 2.08 \]

   Calculator: Choose 1-Prop z-test
   \[ Z = 2.08 \]
   \[ p = 0.0376 \]

   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 50 staff nurses in Tampa and 50 staff nurses in Dallas is conducted with the following results.

<table>
<thead>
<tr>
<th></th>
<th>Tampa</th>
<th>Dallas</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n_1)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>(\bar{x}_1)</td>
<td>$56,000</td>
<td>$58,300</td>
</tr>
<tr>
<td>(s_1)</td>
<td>$6,300</td>
<td>$6,800</td>
</tr>
</tbody>
</table>

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

\[ H_0: \mu_1 \geq \mu_2 \]

\[ H_a: \mu_1 < \mu_2 \]

b. Find the test statistic and \(p\)-value. You may use the fact that the degrees of freedom are 97.433 if you are using the tables.

**By hand**

\[
t = \frac{56,000 - 58,300}{\sqrt{\frac{6300^2}{50} + \frac{6800^2}{50}}} = -1.75
\]

**Use 1.75**

\[ df = 97.433 \]

**Use 97 row on table**

\[ t \text{ between } 1.66 \text{ and } 1.965 \]

**Calculator**

\[ t = -1.75 \]

\[ p = .0412 \]

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 the null.*

*We do not have enough evidence to conclude the nurses in Tampa are paid less than nurses in Dallas.*