Inferences from two samples.

Use the traditional method to test the given hypothesis. Assume that the samples are independent and that they have been randomly selected.

1) Use the given sample data to test the claim that \( p_1 > p_2 \). Use a significance level of 0.01.

\[
\begin{array}{ll}
\text{Sample 1} & \text{Sample 2} \\
\hat{p}_1 = 0.38 & \hat{p}_2 = 0.23 \\
N_1 = 85 & N_2 = 90 \\
\end{array}
\]

\[ H_0 : p_1 = p_2 \quad \text{Test Stat: } Z = 2.66 \]

\[ P \text{-value} = 0.0039 < \alpha \]

\[ \alpha = 0.01 \]

**REJECT** \( H_0 \).

2) A researcher finds that of 1000 people who said that they attend a religious service at least once a week, 31 stopped to help a person with car trouble. Of 1200 people interviewed who had not attended a religious service at least once a month, 22 stopped to help a person with car trouble. At the 0.05 significance level, test the claim that the two proportions are equal.

\[ H_0 : p_1 = p_2 \quad H_1 : p_1 \neq p_2 \]

\[ \alpha = 0.05 \quad P \text{-value} = 0.0537 > \alpha \]

**FAIL TO REJECT** \( H_0 \).

3) Two types of flares are tested and their burning times (in minutes) are recorded. The summary statistics are given below.

\[
\begin{array}{ccc}
\text{Brand X} & \text{Brand Y} \\
N & n & \bar{x} & s \\
35 & 40 & 19.4 \text{ min} & 1.4 \text{ min} \\
15 & 15 & 15.1 \text{ min} & 0.8 \text{ min} \\
\end{array}
\]

\[ \alpha = 0.05 \]

Use a 0.05 significance level to test the claim that the two samples are from populations with the same mean. Use the traditional method of hypothesis testing.

\[ H_0 : \mu_1 = \mu_2 \quad H_1 : \mu_1 \neq \mu_2 \]

\[ Z = 16.025 \]

\[ P \text{-value} = 0.000 < \alpha \]

**REJECT** \( H_0 \).

4) A researcher was interested in comparing the amount of time (in hours) spent watching television by women and by men. Independent simple random samples of 14 women and 17 men were selected, and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

\[
\begin{array}{cc}
\text{Women} & \text{Men} \\
\bar{x}_1 & \bar{x}_2 \\
12.1 \text{ hr} & 14.2 \text{ hr} \\
S_1 & S_2 \\
3.9 \text{ hr} & 5.2 \text{ hr} \\
N_1 & N_2 \\
14 & 17 \\
\end{array}
\]

Use a 0.05 significance level to test the claim that the mean amount of time spent watching television by women is smaller than the mean amount of time spent watching television by men. Use the traditional method of hypothesis testing.

\[ H_0 : \mu_1 = \mu_2 \quad H_1 : \mu_1 < \mu_2 \]

\[ t = -1.283 \]

\[ P \text{-value} = 0.209 > \alpha \]

**FAIL TO REJECT** \( H_0 \).
5) A researcher wishes to determine whether people with high blood pressure can reduce their blood pressure, measured in mm Hg, by following a particular diet. Use a significance level of 0.01 to test the claim that the treatment group is from a population with a smaller mean than the control group. Use the traditional method of hypothesis testing.

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>n₁ = 101</td>
<td>n₂ = 105</td>
</tr>
<tr>
<td>( \bar{x}_1 = 120.5 )</td>
<td>( \bar{x}_2 = 149.3 )</td>
</tr>
<tr>
<td>( s_1 = 17.4 )</td>
<td>( s_2 = 30.2 )</td>
</tr>
</tbody>
</table>

\[ H_0: \mu_1 = \mu_2 \]
\[ H_1: \mu_1 < \mu_2 \]
\[ \alpha = 0.01 \]

\[ t = -8.426 \]
\[ p = 0 < \alpha \]
Reject \( H_0 \).

6) A researcher was interested in comparing the salaries of female and male employees at a particular company. Independent simple random samples of 8 female employees and 15 male employees yielded the following weekly salaries (in dollars).

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>495</td>
<td>722</td>
</tr>
<tr>
<td>760</td>
<td>562</td>
</tr>
<tr>
<td>556</td>
<td>880</td>
</tr>
<tr>
<td>904</td>
<td>520</td>
</tr>
<tr>
<td>520</td>
<td>500</td>
</tr>
<tr>
<td>1005</td>
<td>970</td>
</tr>
<tr>
<td>743</td>
<td>500</td>
</tr>
<tr>
<td>660</td>
<td>690</td>
</tr>
</tbody>
</table>

\( n = 8 \) \hspace{1cm} \( n = 15 \)

\[ H_0: \mu_1 = \mu_2 \]
\[ H_1: \mu_1 < \mu_2 \]

\[ t = -1.64 \]
\[ p_{\text{value}} = 0.157 \]

\[ p_{\text{value}} > \alpha \]
Fail to reject \( H_0 \).

Use a 0.05 significance level to test the claim that the mean salary of female employees is less than the mean salary of male employees. Use the traditional method of hypothesis testing.

(Note: \( \bar{x}_1 = $705.375 \), \( \bar{x}_2 = $817.067 \), \( s_1 = $183.855 \), \( s_2 = $330.146 \).

Construct the indicated confidence interval for the difference between the two population means. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal.

7) Two types of flares are tested and their burning times are recorded. The summary statistics are given below.

<table>
<thead>
<tr>
<th>Brand X</th>
<th>Brand Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 35</td>
<td>n = 40</td>
</tr>
<tr>
<td>( \bar{x} = 19.4 \text{ min} )</td>
<td>( \bar{x} = 15.1 \text{ min} )</td>
</tr>
<tr>
<td>s = 1.4 min</td>
<td>s = 0.8 min</td>
</tr>
</tbody>
</table>

\[ 2 \text{ Sample } T-\text{INT} \]

Construct a 95% confidence interval for the differences between the mean burning time of the brand X flare and the mean burning time of the brand Y flare.

A) 3.5 min < \( \mu_X - \mu_Y \) < 5.1 min
B) 3.8 min < \( \mu_X - \mu_Y \) < 4.8 min
C) 3.6 min < \( \mu_X - \mu_Y \) < 5.0 min
D) 3.2 min < \( \mu_X - \mu_Y \) < 5.4 min
8) Independent samples from two different populations yield the following data $\bar{x}_1 = 677, \bar{x}_2 = 211$, $s_1 = 30, s_2 = 30$. The sample size is 245 for both samples. Find the 80% confidence interval for $\mu_1 - \mu_2$.

A) 462 < $\mu_1 - \mu_2$ < 470  
B) 466 < $\mu_1 - \mu_2$ < 466  
C) 463 < $\mu_1 - \mu_2$ < 469  
D) 460 < $\mu_1 - \mu_2$ < 472

9) A researcher was interested in comparing the amount of time spent watching television by women and by men. Independent simple random samples of 14 women and 17 men were selected, and each person was asked how many hours he or she had watched television during the previous week. The summary statistics are as follows.

<table>
<thead>
<tr>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\bar{x}_1 = 12.8$ hrs</td>
<td>$\bar{x}_2 = 14.0$ hrs</td>
</tr>
<tr>
<td>$s_1 = 3.9$ hrs</td>
<td>$s_2 = 5.2$ hrs</td>
</tr>
<tr>
<td>$n_1 = 14$</td>
<td>$n_2 = 17$</td>
</tr>
</tbody>
</table>

Construct a 99% confidence interval for $\mu_1 - \mu_2$, the difference between the mean amount of time spent watching television for women and the mean amount of time spent watching television for men.

A) -5.71 hrs < $\mu_1 - \mu_2$ < 3.31 hrs  
B) -5.84 hrs < $\mu_1 - \mu_2$ < 3.44 hrs  
C) -5.85 hrs < $\mu_1 - \mu_2$ < 3.45 hrs  
D) -5.72 hrs < $\mu_1 - \mu_2$ < 3.32 hrs

10) A researcher was interested in comparing the heights of women in two different countries. Independent simple random samples of 9 women from country A and 9 women from country B yielded the following heights (in inches).

<table>
<thead>
<tr>
<th>Country A</th>
<th>Country B</th>
</tr>
</thead>
<tbody>
<tr>
<td>64.1</td>
<td>65.3</td>
</tr>
<tr>
<td>66.4</td>
<td>60.2</td>
</tr>
<tr>
<td>61.7</td>
<td>61.7</td>
</tr>
<tr>
<td>62.0</td>
<td>65.8</td>
</tr>
<tr>
<td>67.3</td>
<td>61.0</td>
</tr>
<tr>
<td>64.9</td>
<td>64.6</td>
</tr>
<tr>
<td>64.7</td>
<td>60.0</td>
</tr>
<tr>
<td>68.0</td>
<td>65.4</td>
</tr>
<tr>
<td>63.6</td>
<td>59.0</td>
</tr>
</tbody>
</table>

Construct a 90% confidence interval for $\mu_1 - \mu_2$, the difference between the mean height of women in country A and the mean height of women in country B.

(Note: $\bar{x}_1 = 64.744$ in., $\bar{x}_2 = 62.556$ in., $s_1 = 2.192$ in., $s_2 = 2.697$ in.)

A) 0.17 in. < $\mu_1 - \mu_2$ < 4.21 in.  
B) 0.14 in. < $\mu_1 - \mu_2$ < 4.24 in.  
C) 0.16 in. < $\mu_1 - \mu_2$ < 4.22 in.  
D) 0.15 in. < $\mu_1 - \mu_2$ < 4.23 in.