95% confidence interval for the mean temperature for men

\[
\bar{X} \pm t^* \frac{S}{\sqrt{n}}
\]

What is \( t^* \)?
We need \( n = 10 \) and 95% confidence.

\[
t^* = 2.2622
\]

\[
\bar{X} = 97.88
\]

\[
S = 0.5553777
\]

\[
97.88 \pm (2.2622) \left( \frac{0.5553777}{\sqrt{10}} \right) = \begin{cases} 97.482609 \\ 98.2773008 \end{cases}
\]

95% confidence for females

\[
98.143 \\
98.897
\]
Identify the test (circle one):
1. Significance test for one proportion (1-PropZTest)
2. Significance test for the difference of two proportions (2-PropZTest)
3. Significance test for a mean (T-Test)
4. Significance test for the difference of two means (2-SampTTest)

Data: Significance level $\alpha = .05$
Other: (depending on the test, circle and give the necessary values)

$P_0 = \frac{1015}{64}$
$\hat{p}_1 = \frac{x_1}{n} = \frac{1050}{2}$
$\hat{p}_2 = \frac{x_2}{n_2} = \frac{150}{s}$
$n_1 = n_2 = \frac{s_1}{x_1} = \frac{s_2}{x_2} = \frac{s}{x}$

Check the conditions:
1. The sample was obtained at random.
2. The sample size $n=64$ is big enough (greater than 40).
3. $10n = 640 < \text{total number of students at this particular university}$

State the hypotheses:
$H_0 : M = M_0$
$H_a : M > M_0$

where (circle and describe in words the appropriate symbol(s): $p, P_1, P_2, \mu_1, \mu_2$)

$M = \text{true mean number of hours students study every week.}$

Compute the test statistic, $p$-value, and label and complete the sketch:

Test statistic: $t = \frac{x - M_0}{S/\sqrt{n}} = 1.86666$

$P$-value $= .0333016$

Is the sample significant? $\text{Yes}$/No

Conclusions:
(Circle one) We reject/don't reject the null hypothesis.

Because the $P$-Value $= .0333016 < .05$, we rejected the null hypothesis in favor of the alternate. If the mean number of hours of study time per week was 1015 minutes, then it would be unlikely (probability $3.33\%$) to get a sample of 64 random students with a larger mean than 1050. So we have evidence to assert that indeed the average study time per week is larger than 1015.
Identify the test (circle one):
1. Significance test for one proportion (1-PropZTest)
2. Significance test for the difference of two proportions (2-PropZTest)
3. Significance test for a mean (T-Test)
4. Significance test for the difference of two means (2-SampTTest)

Data: Significance level \( \alpha = 0.05 \)
Other: (depending on the test, circle and give the necessary values)

\[ p_0 = \quad \hat{p} = \quad \bar{x} = 9.25 \]
\[ \mu_0 = 9.3 \quad \hat{p}_1 = \quad \bar{x}_1 = \]
\[ \mu = 15 \quad \hat{p}_2 = \quad \bar{x}_2 = \]
\[ n_1 = \quad x_1 = \quad s_1 = \]
\[ n_2 = \quad x_2 = \quad s_2 = \]

State the hypotheses:
\( H_0 : \mu = \mu_0 \)
\( H_a : \mu \neq \mu_0 \)

where (circle and describe in words the appropriate symbol(s): \( p, p_1, p_2, \mu, \mu_1, \mu_2 \))

\( \mu = \text{true average distance from the earth to the sun.} \)

Check the conditions:
1. Measurements were obtained at random times and places.
2. The data looks normally distributed except for one outlier. We'll do the test with and without the outlier.
3. \( 40n = 150 < \text{total number of measurements from earth to sun (infinitely many)} \)

Compute the test statistic, \( p \)-value, and label and complete the sketch:

Test statistic:
\[ t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{-2.469}{.836} = -6.772 \]

\( P \)-value:
\[ P = 0.0000002 (\text{without the outlier}) \]

Is the sample significant? Yes/No

Conclusions:
(Circle one) We reject/don't reject the null hypothesis.
Explain in context.

Because \( P \)-Value = 0.0000002 < 0.05 we reject the null hypothesis in favor of the alternate.
If the average distance from the earth to the sun was 9.3 million miles, then it would be unlikely (probability 2.69%) to get a sample of 15 measurements as extreme or more than the one we analyzed.

Furthermore, if we remove the outlier at 93.18, then the probability becomes 0.000003%. So we have ample evidence to assert that the A.U. is not equal to 9.3 million miles.
Identify the test (circle one):
1. Significance test for one proportion (1-PropZTest)
2. Significance test for the difference of two proportions (2-PropZTest)
3. Significance test for a mean (T-Test)
4. Significance test for the difference of two means (2-SampTTest)

Data: Significance level $\alpha = .05$
Other: (depending on the test, circle and give the necessary values)

<table>
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<th>$p_0 =$</th>
<th>$\hat{p} =$</th>
<th>$\bar{x} =$</th>
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<td>$\bar{x}_1 =$</td>
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</tr>
<tr>
<td>$n =$</td>
<td>$\hat{p}_2 =$</td>
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<tr>
<td>$n_1 =$</td>
<td>$x_1 =$</td>
<td>$s_1 =$</td>
<td>5.06</td>
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<tr>
<td>$n_2 =$</td>
<td>$x_2 =$</td>
<td>$s_2 =$</td>
<td></td>
</tr>
</tbody>
</table>

$x =$ | $s_2 =$ |

Check the conditions:
1. The sample is not a random sample, we'll proceed but be very wary of our results.
2. The sample size $n=40$ is big enough.
3. $40n = 100 < \text{total number of owners of 2007 Honda Civic Hybrid}$

State the hypotheses:
$H_0 : \mu = \mu_0$
$H_a : \mu > \mu_0$

where (circle and describe in words the appropriate symbol(s): $p, p_1, p_2, \mu_1, \mu_2$)

$\mu =$ true average mpg for 2007 Honda Civic Hybrid cars.
that their owners would report.

Compute the test statistic, $p$-value, and label and complete the sketch:

Test statistic: $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = 1.6249$

$P$-value = .0561

Is the sample significant? Yes/No

Conclusions:
(Circle one) We reject/don't reject the null hypothesis.

Because $P$-Value = .0561 > .05 we don't reject the null hypothesis.
If the average mpg the owners would report is 42 mpg than it is
likely to get a sample of 40 owners with $\bar{x} = 43.3$ and $s = 5.06$ or
more extreme (Probability of this is 5.61%)

So we have no evidence to assert that the actual mpg the owners
would report is larger than 42.
$95\%$ confidence interval for

"bottom" - "mid depth"

$\left( \bar{X}_1 - \bar{X}_2 \right) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

$n_1 = 10 \quad \bar{X}_1 = \underline{6.04} \quad s_1 = \underline{1.579} \quad t^* = ?$

$n_2 = 10 \quad \bar{X}_2 = \underline{5.05} \quad s_2 = \underline{1.103}$

$(-.3009, 2.2809)$

$\sim \mu_1 - \mu_2$

$M_1 = \text{true average aldrin at the bottom}$
$M_2 = \text{true average aldrin at mid-depth}$