

# STAT 110: Practice Problem 20 Solutions

Fall 2017

Consider the data found in the file **LowBirth.JMP**.

Research Question: Is there evidence that the mean birth weight is lower for those children born to women who have uterine irritation?

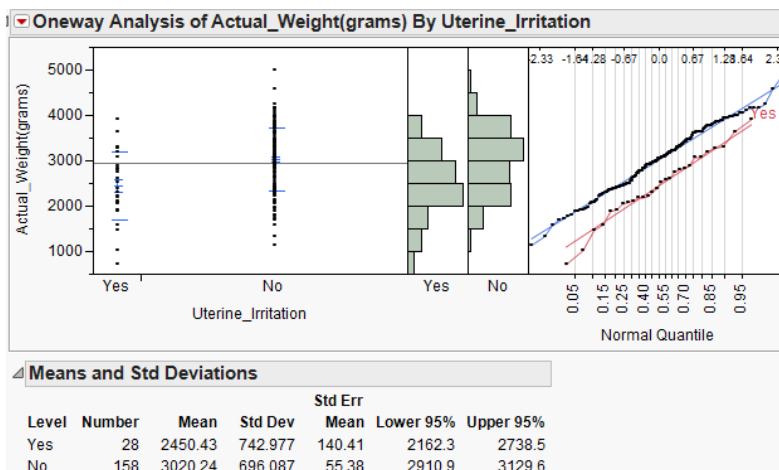
a. Check and comment on the assumptions for this test...

Are the samples independent?

**Yes – the observations from the two groups can't be paired in any meaningful way.**

Are the sample sizes both sufficiently large? If not, is it reasonable to assume that both populations are normally distributed?

**No – the number in the “Yes” group is below 30. The distributions both appear to be normally distributed, however, so a t-test can be used.**

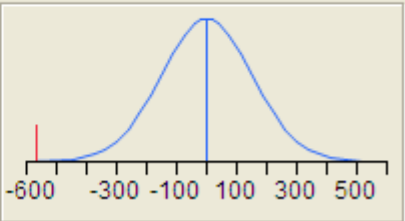


b. Carry out a hypothesis test for our research question.

<b>Step 1:</b>	<p>Write null and alternative hypothesis.</p> <p><b>Let <math>\mu_1</math> = the mean birth weight of babies born to those WITH uterine irritation.</b></p> <p><b>Let <math>\mu_2</math> = the mean birth weight of babies born to those WITHOUT uterine irritation.</b></p> <p><b><math>H_0: \mu_1 = \mu_2</math></b></p> <p><b><math>H_a: \mu_1 &lt; \mu_2</math></b></p>
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<b>Step 2:</b>	<p>Find the test statistic.</p> <div data-bbox="397 315 1364 619"><p><b>t Test</b></p><p>Yes-No</p><p>Assuming unequal variances</p><table><tr><td>Difference</td><td>-569.81</td><td>t Ratio</td><td>-3.7752</td></tr><tr><td>Std Err Dif</td><td>150.94</td><td>DF</td><td>35.90374</td></tr><tr><td>Upper CL Dif</td><td>-263.67</td><td>Prob &gt;  t </td><td>0.0006*</td></tr><tr><td>Lower CL Dif</td><td>-875.95</td><td>Prob &gt; t</td><td>0.9997</td></tr><tr><td>Confidence</td><td>0.95</td><td>Prob &lt; t</td><td>0.0003*</td></tr></table></div> <p><b>Test Statistic: -3.7752</b></p>	Difference	-569.81	t Ratio	-3.7752	Std Err Dif	150.94	DF	35.90374	Upper CL Dif	-263.67	Prob >  t	0.0006*	Lower CL Dif	-875.95	Prob > t	0.9997	Confidence	0.95	Prob < t	0.0003*
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Confidence	0.95	Prob < t	0.0003*																		
<b>Step 3:</b>	<p>Determine p-value.</p> <p><b>p-value: .0003</b></p>																				
<b>Step 4:</b>	<p>Write a conclusion in terms of the original research question.</p> <p><b>The study provides sufficient evidence that the mean birth weight is lower for those children born to women who have uterine irritation than for those born to women without uterine irritation.</b></p>																				

- c. Obtain the appropriate 95% confidence interval for this problem.

**Lower Endpoint = -875.95**

**Upper Endpoint = -263.67**

- d. Interpret the meaning of this 95% confidence interval in a way that a non-statistician would understand.

**We can be 95% confident that the true difference in means is somewhere between -875.95 and -263.67 grams.**

**In other words, we can be 95% confident that the true mean birth weight of babies born to mothers with uterine irritation (UI) is somewhere between 236.67 and 875.95 grams lower than the true mean weight of babies born to mothers without UI.**