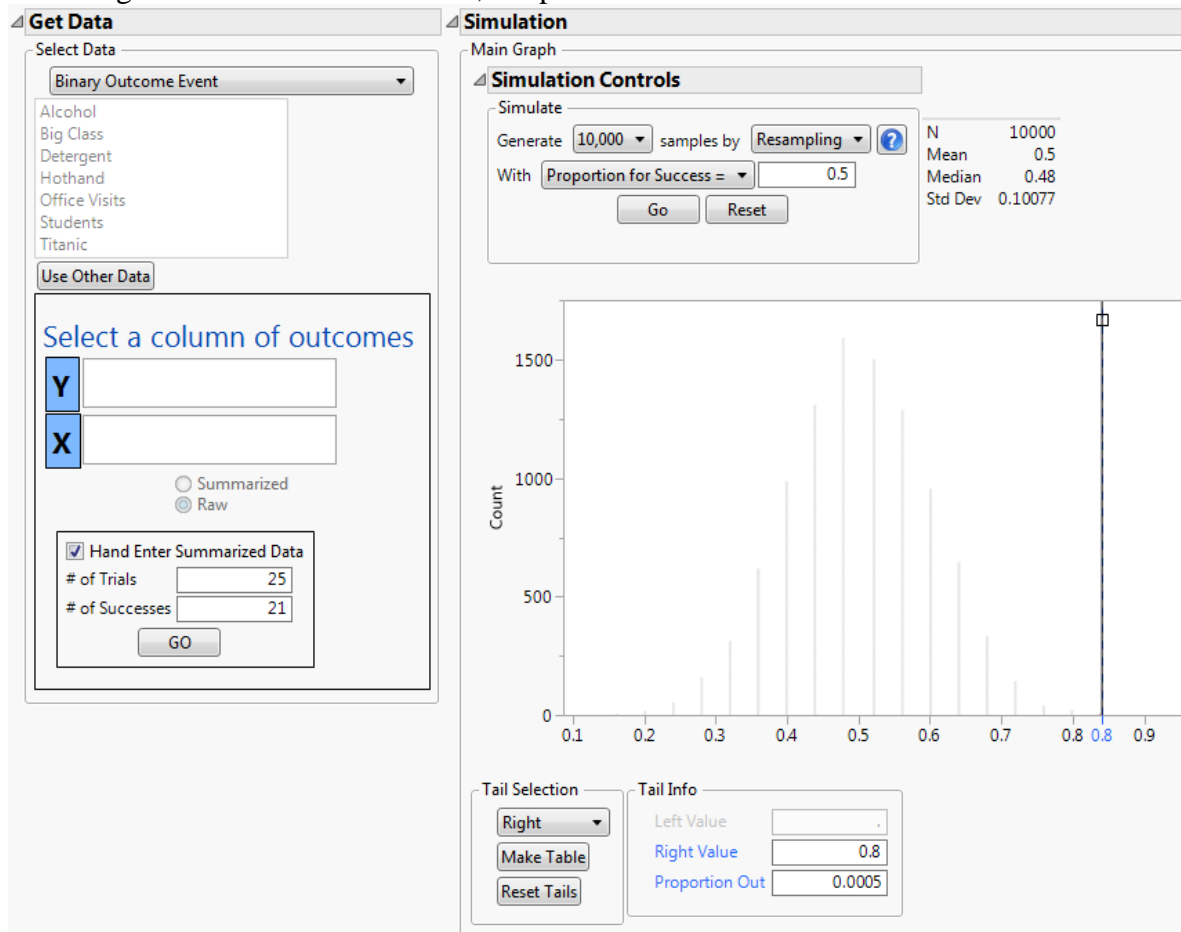


**Data Science – Fall 2016**  
**Homework #5 Solutions**

1a. The null model is that he is guessing at random or that there is a 50% chance he gets each one right.

1b. Using the randomization method, the p-value is 0.0005.



Using the chi-squared test, the p-value is 0.0007

Test Probabilities			
Level	Estim Prob	Hypoth Prob	
Success	0.84000	0.50000	
Failure	0.16000	0.50000	
Test	ChiSquare	DF	Prob> Chisq
Likelihood Ratio	12.6739	1	0.0004*
Pearson	11.5600	1	0.0007*

1c. Both values are less than 0.05. If he guessed randomly, there is a small chance that he could get this result, so we reject the claim that he guess randomly, and conclude that he is able to control the flips. (In reality, he gets it right about 90% of the time)

- 2a. The null model is that whether the O-rings were damaged is not affected by temperature (or that the mean temperature is the same for the damaged and not damaged groups).
- 2b. The p-value using the simulation method is 0.0093

**Get Data**

Select Data  
Two Unpaired Groups, Quantitative Response

O-Ring  
Analgesics  
Big Class  
Cola Heart Rate  
Diet  
Hybrid Fuel Economy  
Lipid Data

Use Other Data

Select one Y and one X

Y Temp  
X Damaged

Stacked Ys  
 Separate Ys

X, N Levels, Values  
Damaged, 2, {"No", "Yes"}

**Simulation**

Main Graph

**Simulation Controls**

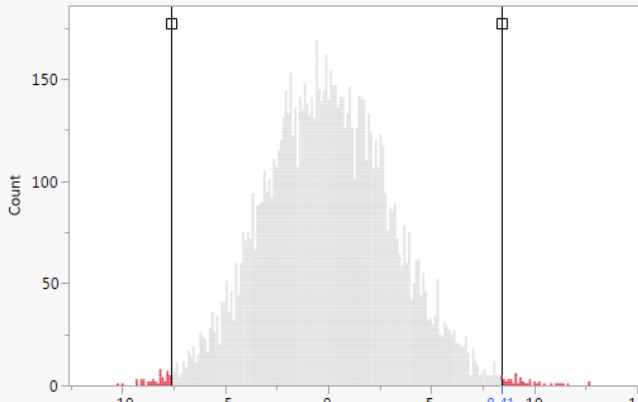
Simulate

Generate 10,000 samples by Resampling

With Difference in Means = 0

Go Reset

N 10000  
Mean 0.0008  
Median -0.067  
Std Dev 3.0939



Count

Tail Selection: Two-Sided

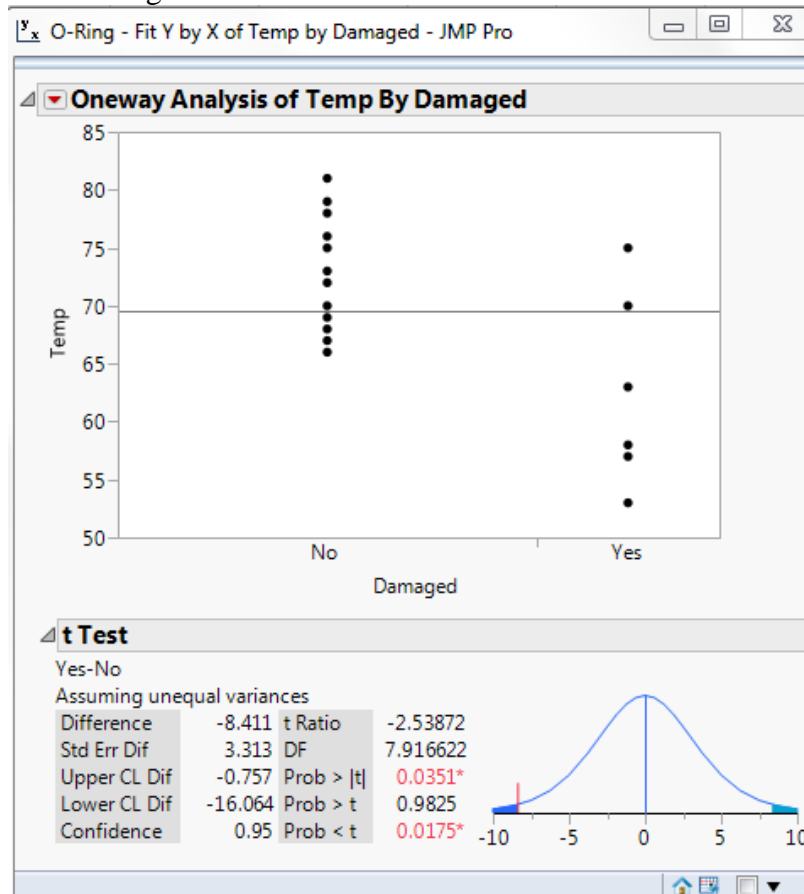
Make Table

Reset Tails

Tail Info

Left Value -7.63  
Right Value 8.41  
Proportion Out 0.0093

The p-value using the t-test method is 0.0351.



2c. Both values are less than 0.05. If the temperature was the same when the O-rings were damaged and when they weren't, there is a small chance we would see these types of differences between the groups. Therefore, we reject the claim that temperature doesn't matter and conclude that the temperature is correlated with whether the O-rings were damaged.

2d. One assumption for the t-test is that either the underlying distribution is normal or the sample size is large (>30) for each group. This is not true, so we should call into question the appropriateness of the two sample t-test for means here. The simulation test is better.