**LAB #4: DOLPHIN THERAPY**

**Directions:** In pairs, work through Lab #4. You should use this Word file to take notes and record output as you proceed through the lab.

**Goals for this lab:**

* Learn how to set up and analyze a two-sided alternative hypothesis
* Explore methods for developing a confidence interval for a process probability

**Name(s): *>>***

(a) Identify the observational units and variables in this study. Also indicate which variable is being considered the explanatory variable and which the response variable.

Observational/Experimental units: *>>*

Explanatory variable: *>>*

Response variable: *>>*

(b) Was this an observational study or an experiment? Explain how you are deciding.

*>>*

The following two-way table summarizes the results of this experiment:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Dolphin Therapy** | **Nature Program** | **Total** |
| **Showed substantial improvement** | 10 | 3 | 13 |
| **Did not show substantial improvement** | 5 | 12 | 17 |
| **Total** | 15 | 15 | 30 |

**Remember to return to the online lab for more instructions.**

(c) Calculate the difference in the conditional proportions of substantial improvement between the two explanatory variable groups.

*>>*

(d) Introduce your graph *>>*

Paste Segmented Bar Graph or Mosaic plot here

(e) Do the data appear to support the claim that dolphin therapy is more effective than the nature program?

*>>*

(f) Simulated difference in conditional proportions (playing cards):

|  |  |  |  |
| --- | --- | --- | --- |
| Repetition #1 | Dolphin Therapy | Nature Program | Total |
| Showed substantial improvement |  |  | 13 |
| Did not show substantial improvement |  |  | 17 |
| Total | 15 | 15 | 30 |

|  |  |  |  |
| --- | --- | --- | --- |
| Repetition #2 | Dolphin Therapy | Nature Program | Total |
| Showed substantial improvement |  |  | 13 |
| Did not show substantial improvement |  |  | 17 |
| Total | 15 | 15 | 30 |

|  |  |  |  |
| --- | --- | --- | --- |
| Repetition #3 | Dolphin Therapy | Nature Program | Total |
| Showed substantial improvement |  |  | 13 |
| Did not show substantial improvement |  |  | 17 |
| Total | 15 | 15 | 30 |

(g) Using the applet, replicate the random assignment process, under the null distribution, once:

Paste “could have been two-way table” here

(h) Press **Shuffle**again to produce a second simulation of the random assignment process under the null hypothesis.

|  |
| --- |
| Paste “could have been two-way table” here  Is the difference in conditional proportions this time the same as that obtained in (g)? Did you expect them to be the same? Explain. |

(i) But we still need to look at a large number of such repetitions to see the long-term pattern in the results:

Paste null distribution here

(j) What values are shaded for the p-value and why? [*Hint*: If you had shaded them yourself, how would you know which ones to shade?]

(k) For the simulation you created, map the components to the research study:

Null hypothesis *>>*

One repetition *>>*

Statistic *>>*

(l) Confirm that the mean of your null distribution is approximately zero. Explain why it makes sense for the observations in this null distribution to have a mean of about zero.

*>>*

(m) *Interpret* the resulting p-value *in context*:

*See guidelines in online lab >>*

(n) *Evaluate*the p-value: Does this p-value provide strong evidence against the null hypothesis? Clearly indicate how you are deciding. [Remember the [guidelines](http://www.rossmanchance.com/iscam3/labs/lab1KMS/lab1_12.html) from Lab 1.]

*>>*

(o) *Draw appropriate conclusions (significance, causation, generalizability).*

*See guidelines in online lab >>*

**Lab Report:** Proofread your report and make sure you have integrated the numerical and graphical summaries of the sample and the screen captures of your simulation results/approximate p-value for both studies into the body of your report.  Please note that I will pay particular attention your description of the reasoning process in drawing your conclusions. Be very clear how you are coming to your decision of whether or not you are now convinced that there is a beneficial genuine effect from swimming with dolphins. If you worked together with a partner in writing this report, submit one report with both of your names.