Problem Set 1

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Introduction

Questions are 10 points each.

These questions were rendered in R markdown through RStudio (https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf, http://rmarkdown.rstudio.com).

Please upload a knitted pdf of your solutions and the Rmd file. Please attach all packages used in your solutions in the first code block, using the "library" function.

Question 1

Using the data from the polio trials and the simulation methods from inference_example_polio.Rmd, please calculate and display the proportion of all polio cases to the study population for the "Vaccinated" and "Placebo" groups in the "RandomizedControl" experiment.

```
library(HistData)
```

```
## Warning: package 'HistData' was built under R version 3.4.4
dat<-PolioTrials
```

Question 2

Using the probability model that the total number of all polio cases in the "Vaccinated" and "Placebo" group together is fixed and these were randomly assigned to the "Vaccinated" and "Placebo" groups according to the proportions of the study population in each group, please estimate the probability of obtaining a count of all polio cases for the "Vaccinated" group in the "RandomizedControl" experiment that is less than or equal to the observed number.

Please use the simulation methods from inference_example_polio.Rmd.

Please discuss whether the observed results are likely under this model, and relate this to the question of whether the vaccination was effective in reducing the total number of polio cases in a group.

Question 3

Consider the probability model that the number of all polio cases in the "Vaccinated" group of the "ObservedControl" experiment is a draw from the binomial distribution with the number of trials equal to the number of children in the "Vaccinated" group and the probability of "success" is equal to the proportion of polio cases in the "Vaccinated" and "Grade2NotInoculated" groups combined. Without simuation, calculate the probability of a draw that is less than or equal to the observed value.

Question 4

Specify a null hypothesis with its probability model to address the question of whether the counts of total polio cases in the "Vaccinated" groups in both experiment are consistent with equal risk of polio in each group. Explain how to conduct and interpret the analysis based on the null hypothesis.

Question 5

Please implement the test you described in Question 4 and interpret the results.