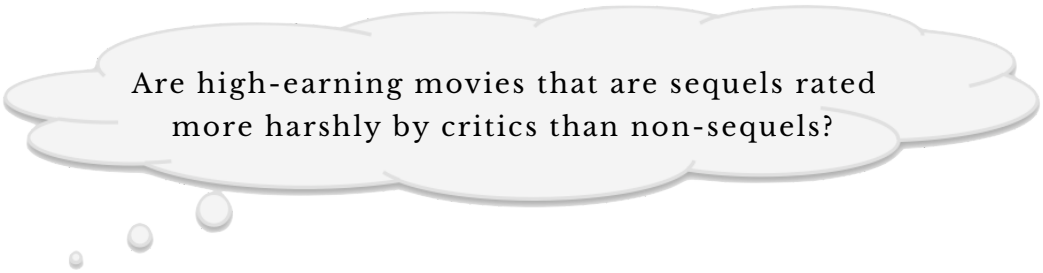
Movie Sequels

As of February 1, 2017, there were 28 major motion pictures in history that earned over $1 billion at the box office, worldwide. Many of these box office winners were sequels to other movies. While these sequels clearly earned a lot of money, many movie sequels are widely panned by critics. In this activity you will examine the following research question:



Rotten Tomatoes is a popular service that aggregates critics' reviews of movies into a "Rotten Tomatoes Score". Each of the critics' reviews are rated as positive or negative. The Rotten Tomatoes Score indicates the percentage of positive reviews that the movie received. On the *Rotten Tomatoes* website, movies are given a *Tomatometer* rating based on their score.

Another rating system used by some movie watchers is the *Meg Classification System* (MCS). Any movie having a Rotten Tomatoes Score at or above 80 is classified as "Ripe", while those films having a score below 80 are classified as "Moldy".

Observed Data: Of the 28 movies that earned over $1 billion, 17 were given a MCS rating of "Ripe". Seven of the 11 non-sequels received an MCS rating of "Ripe".

Explore the Observed Data

1. Organize the observed data (i.e., frequencies) into a 2x2 contingency table.

2. Compute and report: (a) the percentage of movie sequels that were rated as "Ripe"; (b) the percentage of non-sequels that were rated as "Ripe", and (c) the observed difference in percentages.

3. Write a few sentences summarizing the results in the sample. This summary should include a summary of what the data suggest about: (1) the overall percentage of movies rated as "Ripe"; (2) the differences between the two groups of movies; and (3) whether or not the data appear to support the claim that sequels are rated more harshly by critics than non-sequels.

Model the Chance Variation

Consider a sampler that you could simulate from in order to explore the chance variation that would be expected in the difference of percentages if there really was no difference in how harshly critics reviewed sequels and non-sequels.

4. Based on the study design, should the sampler model experimental variation or sampling variation? Explain.

5. In the space below draw a picture of your sampler that you will use to generate outcomes. Be sure to clearly indicate whether each device in your sampler is sampling with or without replacement.

Simulate and Evaluate the Results

- Use TinkerPlots™ to carry out 500 trials of the simulation.
- Collect and plot the results from these trials.

6. Sketch the plot of the distribution of simulated differences into your word-processed document. Also give the *expected mean* based on the model and compute and report the standard deviation.

7. Compute and report the p-value based on the observed result.

8. Based on the p-value you computed, how compatible is the observed difference in means with the results produced by the model specified in the null hypothesis? What does this suggest about the answer to the research question? Explain.

Design and Inference

9. How would you rate the level of internal validity evidence based on the study design? Explain.

10. Based on your response to the previous question, are you willing to draw a causal association between whether a movie is a sequel or not and whether it receives a positive review? If not, offer at least two other possible explanations for the difference in percentage in the data.

11. How would you rate the level of external validity evidence based on the study design? Explain.

12. Based on your response to the previous question, are you willing to draw a generalization about all movies, even those that didn't earn $1 billion? Explain.