

Math 21 Project 1

Simulating Samples for Qualitative Data

In this project we will use StatCrunch's "Coin Flipping" simulator.

To access the simulator: StatCrunch > Applets > Simulation > Coin Flipping

- On the first screen, the probability of heads is the claimed population proportion (in decimal form). For example, if it is claimed that 64% of COS students are female, use 0.64.
- On the first screen, the number of tosses is the sample size n .
- In the applet, next to Number of heads you can change the sign (\leq or \geq) as well as the actual number of successes in the sample.

Part 1

You took a sample of 1000 COS students and found that 360 owned an iPhone. Apple claims that 40% of college students own an iPhone.

Use the simulator to draw a sample of 1000 students (# of tosses = 1000), 1000 different times (1000 runs), assuming that 40% of students own an iPhone (probability of heads = 0.40).

a) How many times did your simulated sample contain 360 or fewer iPhone owners?

b) Is "360 or fewer iPhone owners" an unusual event? (*Recall that an unusual event occurs less than 5% of the time.*)

c) Find the critical values for this experiment. (*The lower critical value is the largest number of females for which fewer than 2.5% of the samples have that number of iPhone owners or fewer. The upper critical value is the smallest number of females for which fewer than 2.5% of the samples have that number of iPhone owners or more.*)

Part 2

Your statistics instructor claimed that only about 60% of Math 21 students pass the class. Your friend in the research office took a random sample of 800 students who took Math 21, and 510 of them passed the class.

Use the simulator to draw a sample of 800 students, 1000 different times, assuming that 60% of students pass Math 21.

- a) How many times did your simulated sample contain 510 or more students who passed?

- b) Is “510 or more students passed” an unusual event?

- c) Based on these results, has your friend provided you with biased results or has your instructor lied to you? Explain your choice.

- d) What are the critical values for this experiment?

Part 3

In this part, use the sample of your classes from the first week of class.

You have been told that 50% of COS students are female.

Use the simulator to draw a sample of n students 1000 different times, assuming that 50% of COS students are female.

- a) Find the critical values for this experiment.

- b) Is the number of females in your sample contained between the critical values, or is your sample an unusual outcome?

- c) Change the percentage of females at COS from 50% to 55% and recalculate the critical values.

- d) Is the number of females in your sample an unusual outcome if 55% of all COS students are female?