# Assessment Questions

## One Proportion Resampling Test App

### Homework question:

**Insurance Claims ~** An insurance company states that at least 89% of its claims are settled within 30 days. A consumer group selected a random sample of 62 of the company's claims to test this statement. They found that 53 of the claims were settled within 30 days. Does the consumer group have evidence to disbelieve the insurance company's claim?

1. Write the hypotheses to test if the rate of claims settled within 30 days is significantly less than 89%.
2. To setup a simulation for this situation, we let each claim be represented with a card. We take 100 cards, \_\_\_\_\_\_\_\_\_\_\_ black cards represent claims that are settled within 30 days and \_\_\_\_\_\_\_\_\_\_\_ red cards represent claims that take longer than 30 days to settle. Shuffle the cards and draw **with/without** replacement \_\_\_\_\_\_\_\_\_\_\_ cards representing the random sample of claims. Calculate the proportion of \_\_\_\_\_\_\_\_\_\_\_ cards in the **deck/sample** and call it . Repeat 10,000 times and plot the resulting sample proportions. The p-value will be the proportion of simulations where . is **greater than/less than/beyond** \_\_\_\_\_\_\_\_\_\_\_ .
3. Use the *One Proportion Resampling Test* app to perform the simulation. Draw at least 3000 samples. Report your p-value from the app here, rounded to four decimal places: \_\_\_\_\_\_\_\_\_\_\_
4. What is the correct conclusion, based on your p-value?
5. The p-value is substantially larger than 0.05 and we should not reject the null hypothesis.
6. The p-value is substantially smaller than 0.05 and we should reject the null hypothesis.
7. The p-value is substantially smaller than 0.05 and we should not reject the null hypothesis.
8. The p-value is substantially larger than 0.05 and we should reject the null hypothesis.

### Exam question:

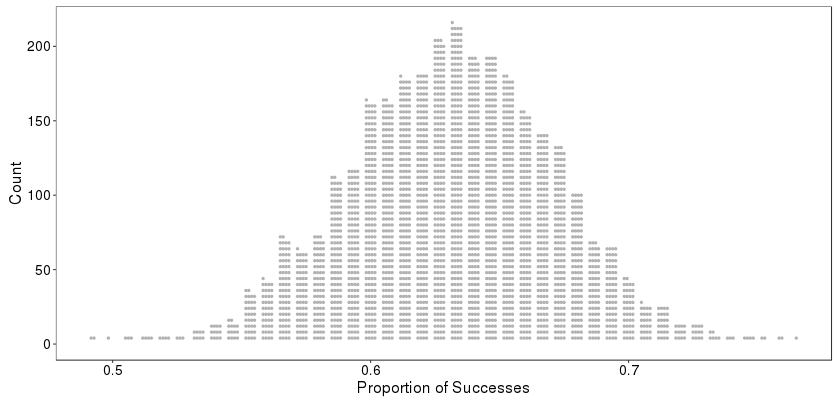
**College Scholarship Programs ~** At a particular college, the admissions website states that 63% of all undergraduate students have received some type of scholarship. A reporter thinks the true rate for current year is higher. She takes a random sample of 150 undergraduate students and finds that 99 (or 66%) have some type of scholarship. The research question the researcher is interested in addressing is…

*Is the proportion of undergraduate students receiving scholarship money this year higher than 63%?*

1. Express this question in terms of a null and alternative hypothesis suitable for a randomization-based hypothesis test.
2. The paragraph below describes how we might use a randomization-based hypothesis test of these hypotheses. Fill in the missing words and circle the appropriate choices to correctly describe how the test could be conducted.

*To setup a simulation for this situation, we let each sampled student be represented with a card. We take 100 cards, \_\_\_\_\_\_\_ black cards representing students with scholarships and \_\_\_\_\_\_\_\_ red cards representing students without them. Shuffle the cards and draw* ***(circle one) with without*** *replacement \_\_\_\_\_ cards representing the random sample of students. Calculate the proportion of* ***(circle one)*** ***black red***  *cards in the*

***(circle one) sample deck*** *and call it . Repeat 3,000 times and plot the resulting sample proportions. The p-value for the test will be the proportion of simulations where* is***(circle one) less than greater than beyond \_\_\_\_\_\_\_\_\_*** *.*



1. The plot above shows the results of a 3,000 shuffle randomization-based test. 789 of the shuffles fell more than 3% *above* the expected proportion of 63%, and 715 shuffles fell more than 3% *below* the expected proportion of 63%. What is the approximate *p-value* for this hypothesis test?
2. Write a brief conclusion to this hypothesis test that indicates your decision regarding the null hypothesis.