Hypothesis testing on a proportion

When we compute a p-value for a hypothesis test, it is "Given the Ho value, the probability of getting data as extreme or more than the data we obtained."

There is a potential difficulty in doing this.

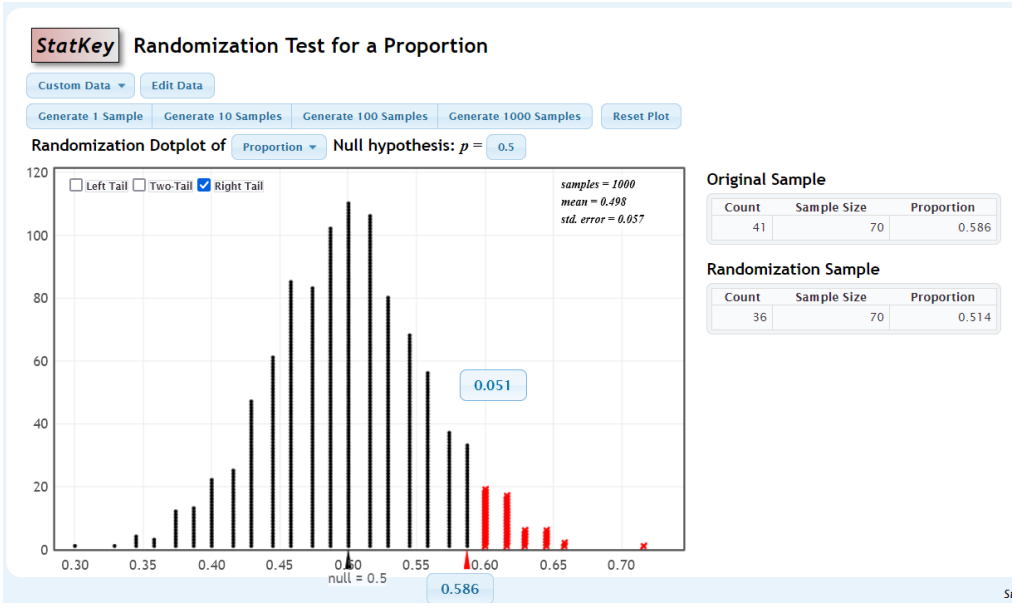
1. Proportions are often given as decimals, which almost always means some rounding.
2. When you round your proportion, it is tricky, then to make sure that your "picture" gives the probability that includes "exactly equal" to the proportion of our data.
3. There are two ways to address this.
    a. If you use the proportion choice, then, when you type in the proportion of your data (along the horizontal axis) type in a value that will clearly "capture" the precise proportion. The rest of this page and the next page illustrate how to use this choice.
    b. Use the choice of "count" rather than proportion. The third page here illustrates how to use this choice.

Example: Consider the claim that the population proportion is 0.5. Our data show 41 successes out of 70 trials.

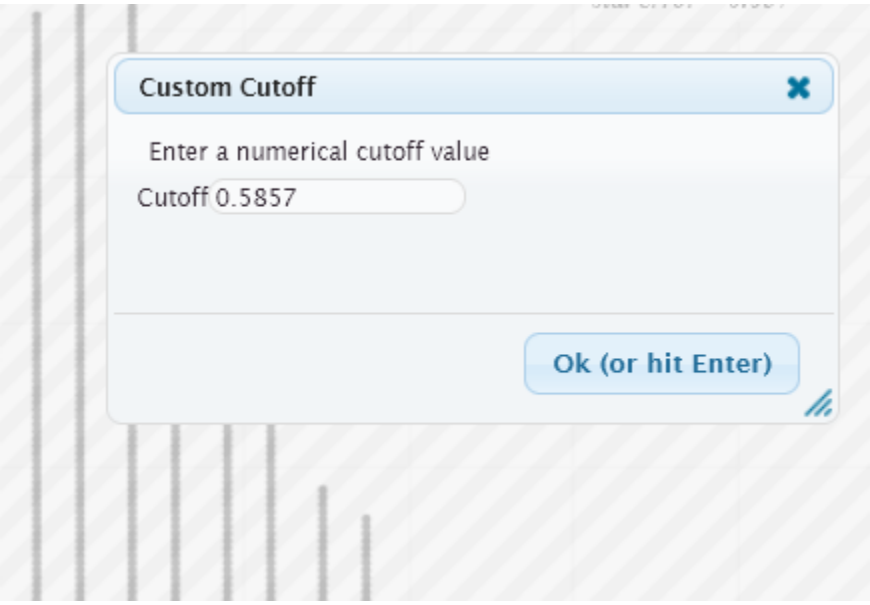
Step 1: The area we want is in the right tail. So we need to shade all the area for values higher than 41/70.

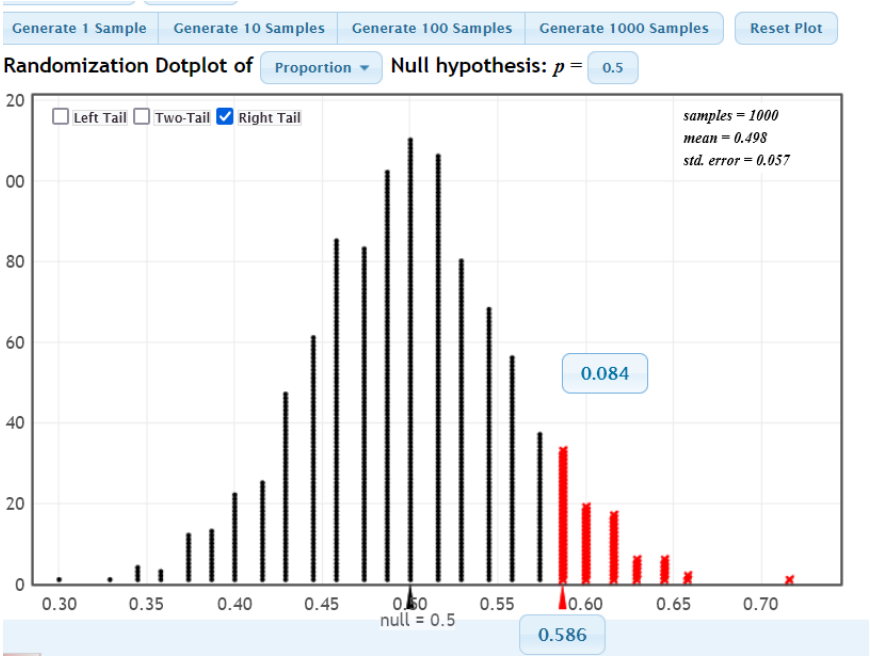
Step 2: The proportion is 41/70 = 0.585714

Step 2: If we round to 3 decimal places, we use 0.586. Then the shaded area WILL NOT include the proportion 41/70 and the answer will not be exactly right. Notice, in the picture below, the shaded area is clearly NOT including the value that is labeled as 0.586. This is a WARNING.



Step 3: Pick any number which is close to (but to the left of) 0.585714. For instance 0.5857. Use that.

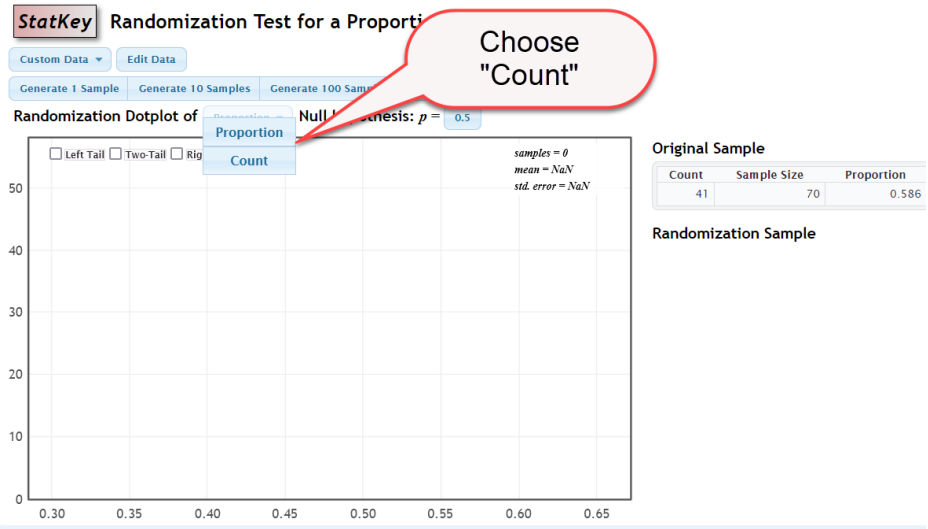


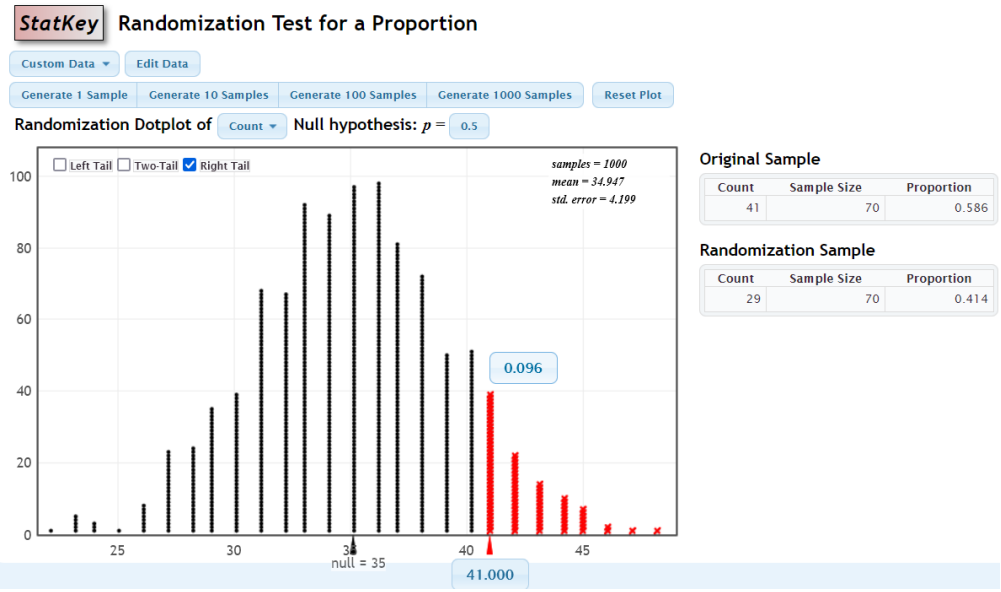


Notice that using this value still "LOOKS" like you used 0.586 because the label along the horizontal axis is rounded to 3 decimal places. BUT the bar above that label is now included, and so the probability (red area) is much different. This value of 0.084 is the correct answer for this question.

Using the “counts” choice:

Step 1: Choose “count”





Notice that this clearly includes the value of 41 in the shaded area. This area of 0.096 is the correct probability.

Notice that this answer doesn’t match the one I found using proportions. That is just because I started the process of doing the simulation again, and the simulations don’t all give the same probability for the answer.

Look on the next page.

Here I have

Left the graph I just computed in the system.

Changed from “Count” to “Proportion”

Repeated the steps I did on page 1 and 2 here to find the area to the right of 0.5857

Found the same answer of 0.096 that I obtained when I used “Count.”