

# Lab Assignment 9

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TR @ 11:30 - 14:15

MATH-338, Dr. Wynne

1. What is the power under the new alternative  $H_1: p = 0.6$ ?
  - **The power would be 0.425878**
2. What is the power under the new alternative  $H_1: p = 0.8$ ?
  - **The power would be 0.9991866**
3. How does the power change as the alternative value of  $p$  gets further from the null value of 0.5?
  - **The power increases as it deviates upward from the null value of 0.5**
4. What is the critical region for  $\alpha = 0.01$ ? Is it a larger or smaller critical region compared to  $\alpha = 0.05$ ?
  - **The new critical region is going to be 36 which is higher than the original value of 32 which was initially found with an alpha of 0.05**
5. Change `crit.value` to the endpoint of the new critical region (from Question #4). Then, run that line and the lines below it to compute power. What is the new power?
  - **The new power is going to be 0.5788821 when you change the critical value**
6. Repeat the steps using  $\alpha = 0.10$ . What is the power of the test at this new  $\alpha$  value?
  - **The new power is going to be 0.09055912 when the value of alpha changes to 0.10**
7. How does the power change as the probability of Type I Error increases? Why do you suspect it changes in that direction?
  - **When the  $\alpha$  changes, the critical value range will subsequently increase as well. This can be seen in the chart below**
  - $\alpha = 0.01 \rightarrow x \geq 36$
  - $\alpha = 0.05 \rightarrow x \geq 33$
  - $\alpha = 0.1 \rightarrow x \geq 32$
  - **This change can be attributed to the Type I Error because choosing lower values of  $\alpha$  make it harder to reject a null hypothesis.**
  - **The act of rejecting a true null hypothesis is considered a Type I Error**
8. What is the critical region for  $n = 30$ ?
  - **The critical region is 25**
9. Change `crit.value` to the endpoint of the new critical region (from Question #8). Then, run that line and the lines below it to compute power. What is the new power?
  - **The new power is 0**
10. Repeat the steps using  $n = 100$ . What is the power of the test using this new sample size?
  - **The new power for the new sample size is going to be 1**
11. How does the power change as sample size increases? Why do you suspect it changes in that direction? (Hint: think about the critical regions in terms of sample proportions!)
  - **As the sample size increases, the power increases as well. This makes sense because as you get more individuals for a study, the data becomes that more accurate. In terms of a critical region, there is a broader range of values you have access to.**

## External Links

- [Consequences of errors and significance \(STATS\)](#)