# Homework 5 (Quiz)

● Graded

**Student**

Anthony Wen

**Total Points**

**8 / 9 pts**

**Question 1**

## Confidence Intervals

**4** / 4 pts

✔ **– 0 pts** Correct

**– 1 pt** minor error

**– 2 pts** large error

**– 3 pts** major error

**– 4 pts** No credit

**Question 2**

## Hypothesis Tests

**4** / 5 pts

**– 0 pts** Correct

✔ **– 1 pt** One incorrect included/omitted

**– 2 pts** Two incorrect included/omitted

**– 2 pts** Two incorrect included/omitted

**Q1 Confidence Intervals**
**4 Points**

Consider the following questions about confidence intervals. Be sure to read the prompt carefully.

a) If many (infinite) samples of size **n** (**n** large) were taken from a population to estimate a known population proportion, and each one was used to construct a **C**% confidence interval (C not equal to 0 or 1), some portion of intervals produced would contain the true proportion, and some portion would not. **What aspect of the estimated sample proportions ($\hat{p}$)** separates those that produce "correct" confidence intervals from those that don't? Your answer should be succinct.

b) **Relative to the estimated sampling distribution**, how wide is a **C**% confidence interval for a population proportion? Your response should be exact and not include any formulas.

a) The location of phat is the aspect that separates the portions that produce "correct" confidence intervals from the ones that don't. It affects the ME, the margin of error (distance from the true population proportion). The "correct" phat would be in the middle C% while the incorrect ones would not.

b) It would be narrower than that of an estimated sampling distribution. Its width ranges from the lower to upper critical value in the estimated sample proportion, which basically means 2 times the margin of error centered on the estimated sample proportion. From the Central Limit Theorem, the width of C% is the width of the center C% of the distribution

**Q2 Hypothesis Tests**
**5 Points**

Consider the following question about hypothesis tests. Be sure to read the prompt carefully.

When testing a specific hypothesis about a population proportion, which of the following steps can be taken to improve the power of the test? For each valid option, explain how it can improve the power of the test. Do not include in your response any options that cannot be used to improve the power of the specified hypothesis test.

- Modify the level α that the hypothesis test consider significant.
- Change the distance between the assumed value of the parameter and the true value of the parameter.
- Change the size of the sample taken for the hypothesis test.
- Remove all sampling variability from the sample.
- Change the size of the population represented by the parameter.

The first 3 options can improve the power of the test but the last 2 cannot.

1. Modify the level α that the hypothesis test considers significant: Changing the significance level α can basically change the probability of getting a Type I error and Type II error and also improve the power of the test. If you increase α it makes it easier to to reject the null hypothesis, increasing the p-value, increasing the power of the test. Decreasing α does the opposite, it would decrease the power of the test.

2. Change the distance between the assumed value of the parameter and the true value of the parameter:  This is basically changing the effect size. If you increase the effect size, the assumed values of the parameters should have a big difference from the null hypothesis, which increases the likelihood of rejecting the null hypothesis when it is false which also increases the power of the test. The same is true for the opposite.

3. Change the size of the sample taken for the hypothesis test: changing this would change the standard error of the estimated values. If you increase the sample size, you would obtain more information and reduce the sample variability, which would lead to a narrower C% confidence level. It basically reduced the Standard Error, making more precise estimates with less random error, making it more likely to detect true effects, and increasing the power of the test.