

MA117 - WORKSHEET 6  
HYPOTHESIS TESTING FOR PROPORTIONS  
Week 2, Tuesday

**Problem 1.** A Rasmussen Reports survey of 1000 US adults found that 42% believe that raising the minimum wage will help the economy.

- (a) Calculate a 95% confidence interval for the true percentage of Americans who believe that raising the minimum wage will help the economy.
- (b) Calculate a p-value for the data under the hypothesis that half of Americans believe that raising the minimum wage will help the economy.

**Problem 2.** 400 students were randomly sampled from a large university, and 289 said they did not get enough sleep.

- (a) Calculate a 99% confidence interval for the true percentage of students at this university who do not get enough sleep.
- (b) Calculate a p-value for the data under the hypothesis that half of students at this university do not get enough sleep.

**Problem 3.** It is believed that nearsightedness affects about 8% of all children. In a random sample of 194 children, 21 were found to be nearsighted.

- (a) Calculate a 98% confidence interval for the true percentage of children who are nearsighted.
- (b) Calculate a p-value for the data under the hypothesis that 8% of children are nearsighted.

**Problem 4.** As we saw yesterday, the `csv` file

`https://sagrawalx.github.io/teaching/data/atlantacrimes.csv`

contains data about a simple random sample of 1000 crimes that occurred in the city of Atlanta between 2009 and 2017. Each row contains information about a single crime from this simple random sample. There are three columns: `crime` classifies the crime into one of several possible types, `date` indicates the date the crime occurred, and `neighborhood` indicates the neighborhood in which the crime occurred.

Suppose a national study indicates that 10% of crimes committed in the United States between 2009 and 2017 were classified as `AUTO THEFT`. Calculate a p-value for the data under the hypothesis that the proportion of crimes committed in Atlanta that are classified as `AUTO THEFT` matches the national proportion of such crimes.

**Problem 5.** What's the difference between "statistically significant" and "practically significant"? Give an example to describe the difference concretely.

**Problem 6.** (a) A study examined the average pay for men and women entering the workforce as doctors for 21 different positions. If both genders were equally paid, then we would expect

about half of those positions to have men paid more than women, and women would be paid more than men in the other half of positions. The study found that, men were, on average, paid more in 19 of those 21 positions. Calculate a p-value for the data under hypothesis that both genders are equally paid.

- (b) (Challenging) How would your p-value calculation change if the study examined just 10 positions, and found that men were paid more in 9 of them? Hint: What's happened with the success-failure condition?