MA117 - Worksheet 7
Hypothesis Testing for Proportions
March 10, 2021 - Week 2, Wednesday

Problem 1. You want to know what percentage of books written by female authors in 2020 feature a female protagonist. You take a simple random sample of 1000 books written by female authors in 2020 and compute a 95% confidence interval for the proportion which feature a female protagonist. The margin of error in your confidence interval is 10%. How big a sample size would you need if you wanted your 95% confidence interval to have a margin of error of 5%?

Problem 2. If we conduct 100 hypothesis tests with significance level 0.05, what is the expected number of times we expect to incorrectly reject the null hypothesis?

Problem 3. A Rasmussen Reports survey of 1,000 US adults found that 42% believe that raising the minimum wage will help the economy. Do a majority of US adults believe that raising the minimum wage will help the economy? Answer this question by conducting a hypothesis test using (a) confidence intervals and (b) p-values.

Problem 4. 400 students were randomly sampled from a large university, and 289 said they did not get enough sleep. Does this represent a statistically significant difference from 50%? Answer this question by conducting a hypothesis test using (a) confidence intervals and (b) p-values.

Problem 5. It is believed that nearsightedness affects about 8% of all children. In a random sample of 194 children, 21 were found to be nearsighted. Does this data provide evidence that the 8% value is inaccurate? Answer this question by conducting a hypothesis test using (a) confidence intervals and (b) p-values.

Problem 6. A study examined the average pay for men and women entering the workforce as doctors for 21 different positions. If each gender was 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. Does this data provide evidence of a gender pay gap in medicine? Answer this question by conducting a hypothesis test using (a) confidence intervals and (b) p-values.