**Activity 7.3.6 – Inference Problems on Population Proportions**

**Confidence Intervals for a Population Proportion**

For problems 1 – 4:

1. Determine the sample proportion.
2. Determine the approximate standard error. Recall that:

$Approximate Standard Error=\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

1. Calculate the margin of error for a 95% confidence interval.
2. Construct a 95% confidence interval for the population proportion.
3. Interpret the confidence interval.
4. In a random sample of 468 high school juniors in the United States, 67 stated their favorite physical activity is soccer. Construct a 95% confidence interval for the proportion of all high school juniors in the United States whose favorite physical activity is soccer.
5. In a random sample of 404 U.S. 12th graders, 101 stated their favorite music is rap or hip-hop. Determine a 95% confidence interval for the proportion of all U.S. 12th graders whose favorite music is rap or hip-hop.
6. How do American adults view the morality of the death penalty? In a random sample of 1500 adults, 31% say the death penalty is morally wrong, even in the case of murder. Find a 95% confidence interval for the proportion of all American adults who feel the death penalty is morally wrong.
7. In a random sample of 408 U.S. 12th graders, 254 stated they intend to pursue a graduate degree. Determine a 95% confidence interval for the proportion of all U.S. 12th graders whose intend to pursue a graduate degree.

**Testing a Claim about a Population Proportion**

For problems 5– 6:

1. State the assumed value for the population proportion.
2. Construct a randomization distribution of sample proportions (using Statkey).
3. Determine the mean and standard error of the simulated distribution of sample proportions.
4. Calculate the observed sample proportion.
5. Find the probability of observing a sample proportion as extreme as the one found.
6. State whether the sample proportion is statistically significant.
7. State a conclusion about the population proportion.
8. A 2013 Gallup Poll of approximately 590,000 students in grades 5 – 12 in the U.S. found that 55% of students are actively engaged in school. A researcher is interested in assessing whether the proportion in 2015 is greater. In 2015, he surveys 100 students in grades 5 – 12 and finds that 63% are actively engaged in school. Does this sample data provide evidence that the population proportion in 2015 is greater than 55%?
9. A 2013 Quinnipiac poll reported that 42% of baseball fans in Connecticut are New York Yankees fans. Let’s assume this is the actual population proportion. A student in a statistics class thinks that a lower proportion of baseball fans at her school are Yankees fans. She randomly surveys 120 baseball fans at her school and finds that 45 are Yankees fans. Does this sample data provide her sufficient evidence to conclude that the proportion of baseball fans at her school that like the Yankees is less than 42%?

**Testing a Claim about a Difference in Population Proportions**

For problems 7 – 8:

1. State the assumption about the population proportions.
2. Construct a randomization distribution of differences in sample proportions (using Statkey).
3. Determine the mean and standard error of the simulated distribution of differences in sample proportions.
4. Calculate the observed sample proportions and the observed difference in sample proportions.
5. Estimate the probability of observing a difference in sample proportions as extreme as the one found.
6. State whether the difference in sample proportions is statistically significant.
7. State a conclusion about the randomization test.
8. Is the proportion of male 11th graders who sometimes fall asleep in class less than the proportion of female 11th graders who do so? Suppose an observational study was conducted on a random sample of 40 male 11th graders and 45 female 11th graders. Each participant was asked whether they sometimes fell asleep in class over the last month. Of the 40 male students, 12 said yes. Of the 45 female students, 17 said yes. Do these samples provide evidence that male 11th graders fall asleep in class at a lower rate than female 11th graders?
9. Do high school students in Connecticut (CT) prefer fall to the other three seasons more than high school students in Massachusetts (MA)? Suppose that an observational study was conducted on a random sample of 44 CT high school students and 52 MA high school students. Each student was asked to identify his or her favorite season. Of the 44 students in CT, 13 said fall. Of the 52 students in MA, 11 said fall. Do these samples provide evidence that a higher proportion of CT students than MA students find fall to be their favorite season?