

## Group Work - Chapter 8

1 Researchers discover a new gene which, under the right circumstances, could lead to a mildly inconvenient, but chronic, disease. 10% of the general population have the gene. One of the researchers thinks that people with naturally red hair are more likely to have the gene.

- (a) What are the null and alternative hypotheses for a test on this claim? Is this a one-sided or two-sided test? Is the claim represented by the null or alternative hypothesis?

$$H_0 : p = 0.1$$

$$H_a : p > 0.1$$

**This is a one-sided test.**

**The claim is represented by the alternative hypothesis.**

- (b) Genetic tests are conducted on a sample of 65 redheads and it is found that 11 of them have the gene. Conduct a test at a  $\alpha = 0.05$  level of significance of the claim that redheads have a higher occurrence of the gene. Be sure to state your conclusion in the context of the question.

**The test statistic is  $z = 1.861$ . The p-value is  $p = 0.0314 < \alpha = 0.05$ . Reject the null hypothesis. There is evidence that redheads have a higher occurrence of the gene.**

**2** According to the Pew Research Center, 73% of adults in the U.S. have broadband access in their homes. An internet access advocacy group thinks that rate is different among Saint Paul high school students.

- (a) What are the null and alternative hypotheses for a test on this claim? Is this a one-sided or two-sided test? Is the claim represented by the null or alternative hypothesis?

$$H_0 : p = 0.73$$

$$H_a : p \neq 0.73$$

**This is a two-sided test.**

**The claim is represented by the alternative hypothesis.**

- (b) A survey of Saint Paul high school students finds that 135 out of 197 students have broadband access in their home. Conduct a test at  $\alpha = 0.05$  level of confidence of the claim that Saint Paul high school students have access to broadband at a different rate than U.S. adults. Be sure to state your conclusion in the context of the question.

**The test statistic is  $z = -1.414$ . The p-value is  $p = 0.1574 > \alpha = 0.05$ . Fail to reject the null hypothesis. There is no evidence that Saint Paul high school students have access to broadband at a different rate than U.S. adults.**

**3** Suppose the mean age of Metro State students is 32 years old. For a research project a stats student wants to examine the idea that students who take statistics classes are the same age as other Metro students.

- (a) What are the null and alternative hypotheses for a test on this claim? Is this a one-sided or two-sided test? Is the claim represented by the null or alternative hypothesis?

$$H_0 : \mu = 32$$

$$H_a : \mu \neq 32$$

**This is a two-sided test.**

**The claim is represented by the null hypothesis.**

- (b) A random sample of 25 statistics students has a mean age of 35.4 with a standard deviation of 4.6. Conduct a test at the  $\alpha = 0.01$  level of significance of the claim that the age of stats students are the same as general Metro State students. Be sure to state your conclusion in the context of the question.

**The test statistic is  $t = 3.696$ . The p-value is  $p = 0.0011 < \alpha = 0.01$ . Reject the null hypothesis. There is evidence that the age of stats students are not the same as general Metro State students.**

4 The data file “bears.csv” on D2L contains measurements of a random sample of bears from a national park. Park officials are concerned that the bear population is underweight and thus not prepared for the long winter. A healthy bear population has a mean weight of 200 lbs.

- (a) What are the null and alternative hypotheses for a test on this claim? Is this a one-sided or two-sided test? Is the claim represented by the null or alternative hypothesis?

$$H_0 : \mu = 200$$

$$H_a : \mu < 200$$

**This is a one-sided test.**

**The claim is represented by the alternative hypothesis.**

- (b) Using the data set, conduct a test at the  $\alpha = 0.05$  level of significance of the claim that the bear population is under weight. Be sure to state your conclusion in the context of the question.

**The test statistic is  $t = 1.032$ . The p-value is  $p = 0.1533 > \alpha = 0.05$ . Fail to reject the null hypothesis. There is no evidence that the bear population is under weight.**