



Problem 1

Topics: categorical variable, two-sided test, p-value

- 1. Driver error can be listed as the cause of approximately 54% of all fatal auto accidents, according to the American Automobile Association. Thirty randomly selected fatal accidents are examined, and it is determined that 14 were caused by driver error. Using $\alpha = 0.05$, is the AAA proportion accurate? Run two sided test to determine if the claimed value $p = 0.54$ is correct.**
 - a. No, we fail to reject the null hypothesis $H_0 : p = 0.54$ at the $\alpha = 0.05$ significance level.
 - b. Yes, we fail to reject the null hypothesis $H_0 : p = 0.54$ at the $\alpha = 0.05$ significance level.
 - c. No, we reject the null hypothesis $H_0 : p = 0.54$ at the $\alpha = 0.05$ significance level.
 - d. Yes, we reject the null hypothesis $H_0 : p = 0.54$ at the $\alpha = 0.05$ significance level.

Problem 2

Topics: categorical variable, one-sided test, p-value

The university is interested in whether or not students support sport passes to be included in tuition and given to all students. This would raise tuition so it is controversial. They conduct a few samples and do a series of confidence intervals and hypothesis tests.

250 random students are sampled to estimate the proportion of students that support sports passes being included in tuition. Of those students 133 support it and 117 oppose.

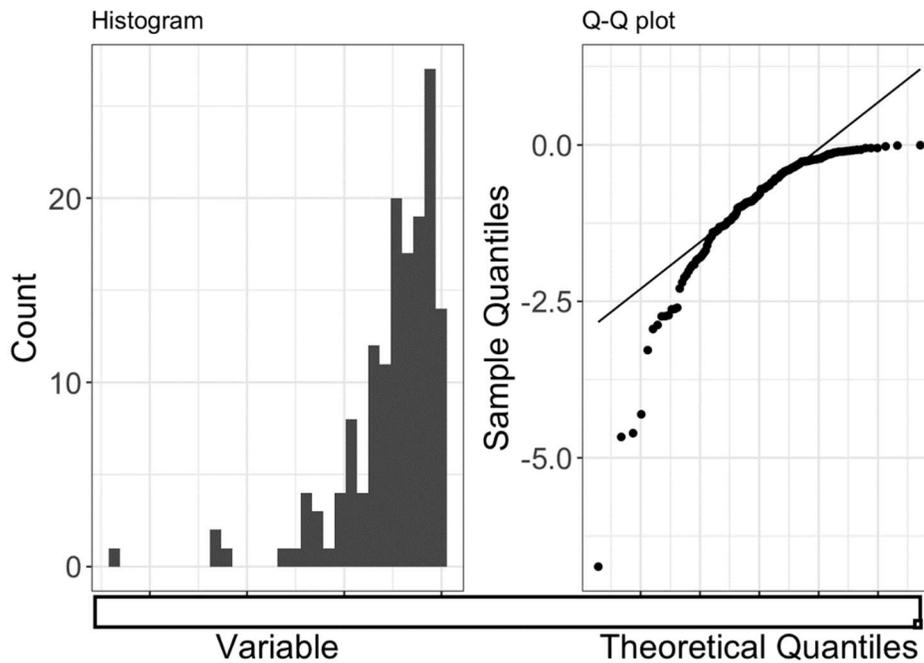
- 2. What is the sample proportion and standard error of that proportion?**
- 3. The university president wants to know if more than half of the students support sport passes being included in tuition. The sample proportion was .52. What would appropriate null and alternative hypothesis be?**
 - a. $H_0 : p = .5, H_a : p > .5$
 - b. $H_0 : p < .5, H_a : p = .5$
 - c. $H_0 : p = .52, H_a : p > .52$
 - d. $H_0 : p > .52, H_a : p = .52$
 - e. $H_0 : \hat{p} = .5, H_a : \hat{p} > .5$
 - f. $H_0 : \hat{p} > .5, H_a : \hat{p} = .5$
- 4. The above hypothesis test is conducted. The p-value is 0.04 and the sample proportion was .52. What is the correct interpretation of this p-value**
 - a. There is a 0.04 probability that the population proportion is .52.
 - b. The true proportion must be bigger than .50.

- c. If multiple samples and hypothesis tests were done, approximately 4% of them would be have sample means further away from the null hypothesis.
- d. There is a 0.04 probability that the null hypothesis is correct

Problem 3

Topics: numerical variable, two-sided test, p-value

You wish to test a claim that $\mu \neq 38$ at a level of significance of $\alpha = 0.05$, and you are given the following information: $\bar{x} = 37.1$, $n = 35$ and $s = 2.7$. The observations are plotted in the following histogram and qq plot.



5. Compute the value of the test statistic.

- a. -3.12
- b. -2.86
- c. -1.97
- d. -1.83

6. Are the conditions satisfied for the reported test-statistic?

A patient named Diana was diagnosed with Fibromyalgia, a long-term syndrome of body pain, and was prescribed anti-depressants. Being the skeptic that she is, Diana didn't initially believe that anti-depressants would help her symptoms. However after a couple months of being on the medication she decides that the anti-depressants are working, because she feels like her symptoms are in fact getting better.

¹ Math-UOttawa ² UVermont ³ Utts ⁴ OpenIntro



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- (a) Write the hypotheses in words for Diana's skeptical position when she started taking the anti-depressants.
- (b) What is a Type 1 Error in this context?
- (c) What is a Type 2 Error in this context?