

Homework Problems (due as one file to the drop box by Friday 7/24 at 11:59 PM)[Chapter 9 Homework](#)

#63, 64, 68, 69

#73 (show the complete testing process as taught in notes, instead of the parts the e-text asks for)

#84 (show the complete testing process as taught in notes)

63. D

Over the past few decades, public health officials have examined the link between weight concerns and teen girls' smoking. Researchers surveyed a group of 273 randomly selected teen girls living in Massachusetts (between 12 and 15 years old). After four years the girls were surveyed again. Sixty-three said they smoked to stay thin. Is there good **evidence that more than thirty percent of the teen girls smoke to stay thin**? The alternative hypothesis is:

- a. $p < 0.30$
- b. $p \leq 0.30$
- c. $p \geq 0.30$
- d. $p > 0.30$

64. C.

A statistics instructor believes **that fewer than 20% of Evergreen Valley College (EVC) students** attended the opening night midnight showing of the latest Harry Potter movie. She surveys 84 of her students and finds that 11 attended the midnight showing. An appropriate alternative hypothesis is:

- a. $p = 0.20$
- b. $p > 0.20$
- c. $p < 0.20$
- d. $p \leq 0.20$

68. B

When a new drug is created, the pharmaceutical company must subject it to testing before receiving the necessary permission from the Food and Drug Administration (FDA) to market the drug. Suppose the null hypothesis is “the drug is unsafe.” What is the Type II Error?

- a. To conclude the drug is safe when in, fact, it is unsafe.
- b. Not to conclude the drug is safe when, in fact, it is safe.
- c. To conclude the drug is safe when, in fact, it is safe.
- d. Not to conclude the drug is unsafe when, in fact, it is unsafe.

69. C

A statistics instructor believes that fewer than 20% of Evergreen Valley College (EVC) students attended the opening midnight showing of the latest Harry Potter movie. She surveys 84 of her students and finds that 11 of them attended the midnight showing. The Type I error is to conclude that the percent of EVC students who attended is _____.

- a. at least 20%, when in fact, it is less than 20%.
- b. 20%, when in fact, it is 20%.
- c. less than 20%, when in fact, it is at least 20%.
- d. less than 20%, when in fact, it is less than 20%

73.

The National Institute of Mental Health published an article stating that in any one-year period, approximately 9.5 percent of American adults suffer from depression or a depressive illness. Suppose that in a survey of 100 people in a certain town, seven of them suffered from depression or a depressive illness. Conduct a hypothesis test to determine if the true proportion of people in that town suffering from depression or a depressive illness is lower than the percent in the general adult American population.

SHOW THE COMPLETE TESTING PROCESS

Population

The variable is whether or not a person suffers from depression or a depressive illness; it is categorical...the results will be counted.

P = the true proportion of American adults who suffer from depression or a depressive illness

Goal: Test to determine if the proportion is less than .095.

Method

Ho: $p = .095$

Ha: $p < .095$

Alpha = .05

Z curve

Sample

$(100)(.095)(1 - .095) = 8.59$ ← the sample does not appear to be large enough for this hypothesized proportion. We will not trust the results of this test.

WORK HOURS (#85)

Test and CI for One Proportion

Method

p: event proportion

Normal approximation method is used for this analysis.

Descriptive Statistics

| | | | 95% Upper Bound |
|-----|-------|----------|-----------------|
| N | Event | Sample p | for p |
| 100 | 7 | 0.070000 | 0.111968 |

Test

Null hypothesis $H_0: p = 0.095$

Alternative hypothesis $H_a: p < 0.095$

| Z-Value | P-Value |
|---------|---------|
| -0.85 | 0.197 |

Results

$Z = -.85$

The sample proportion is .85 standard errors below the hypothesized proportion of .095.

P-value = .197

Assuming the true proportion is .095, there is a .197 probability of getting a sample proportion at least as extreme as the one we got from sampling.

Conclusion

Is the P-value less than .05? No, we cannot reject the null.

At the 5% level of significance, the sample data DOES NOT provide sufficient evidence to say that the true proportion of American adults who suffer from depression or a depressive illness is less than .095.

Everyday conclusion

No, the people in that town suffering from depression or a depressive illness **is NOT statistically lower** than the percent in the general adult American population. I am concerned, though, since we did not meet the normality requirement for this test. I suggest future researchers increase the sample size.

84.

A poll done for *Newsweek* found that 13% of Americans have seen or sensed the presence of an angel. A contingent doubts that the percent is really that high. It conducts its own survey. Out of 76 Americans surveyed, only two had seen or sensed the presence of an angel. As a result of the contingent's survey, would you agree with the *Newsweek* poll?

SHOW THE COMPLETE TEST PROCESS

Population

The variable is whether or not a person has seen or sensed the presence of an angel; it is categorical...the results will be counted.

P = the true proportion of Americans who have seen or sensed the presence of an angel

Goal: Test to determine if the proportion is less than .13.

Method

Ho: $p = .13$

Ha: $p < .13$

Alpha = .05

Z curve

Sample

$(76)(.13)(1 - .13) = 8.59$ The sample size is not large enough for the 13% as the center of the z curve. We have not met the normality assumption. We will not trust the hypothesis test results.

WORK HOURS (#85)

Test and CI for One Proportion

Method

p: event proportion

Normal approximation method is used for this analysis.

Descriptive Statistics

| | | 95% Upper Bound | |
|----|-------|-----------------|----------|
| N | Event | Sample p | for p |
| 76 | 2 | 0.026316 | 0.056518 |

Test

Null hypothesis $H_0: p = 0.13$

Alternative hypothesis $H_a: p < 0.13$

| Z-Value | P-Value |
|---------|---------|
| -2.69 | 0.004 |

The normal approximation may be inaccurate for small samples.

Results

Z = 2.69

The sample proportion is 2.69 standard errors above the hypothesized proportion of .13.

P-value = .004

Assuming the true proportion is .13, there is a .004 probability of getting a sample proportion at least as extreme as the one we got from sampling.

Conclusion

Is the P-value less than .05? YES, we CAN reject the null.

At the 5% level of significance, the sample data DOES provide sufficient evidence to say that the true proportion of Americans who have seen or sensed the presence of an angel is less than .13.

Everyday conclusion

I do not believe the Newsweek poll since we have statistically significant results showing the percentage is less than 13%.

OPTIONAL:

In complete sentences, also give three reasons why the two polls might give different results.

Answers may vary:

The group that doubted the claim may not have gathered a random sample.

The Newsweek poll may have selected people from their audience to complete the survey. These folks might be biased.

Other ideas?