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Course > Inference: Hypothesis Testing for the Population Proportion > Issues in Hypothesis Testing > Extra Problems

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## Extra Problems

These extra questions are here to give you more practice if you feel you need it. No new concepts are introduced on this page. If you've "got it", go ahead and move on to the next page. If you'd like a little more practice, work through the questions below.

### Scenario: Increase in Spam Email at Home and Work

After reading an article using research done by the Organization for Economic Co-operation and Development (OECD) based in France, a statistics student decided to conduct his own study to see if the figures in the article were accurate. This article stated that 37% of email users said spam has increased in their personal email accounts and 29% said it has increased in their work email accounts.

To test the first figure, let  $p$  be the proportion of email users who feel that spam has increased in their personal email. The first set of hypotheses that the student wants to test is then:

$$H_0: p = 0.37$$

$$H_a: p \neq 0.37$$

Based upon the data collected by this student, a 95% confidence interval for  $p$  was found to be: (0.25, 0.32).

### Question

1/1 point (graded)

At the 0.05 level of significance, which conclusion can be made?

- ☐ The student can not reject  $H_0$ , since 0.37 falls within the limits of the interval.
- ☐ The student can reject  $H_0$ , since 0.37 falls within the limits of the interval.
- ☒ The student can reject  $H_0$ , since 0.37 does not fall within the limits of the interval. ✓
- ☐ The student can not reject  $H_0$ , since 0.37 does not fall within the limits of the interval.

**Answer**

Correct:

Since 0.37 is not between 0.25 and 0.32, it is not a plausible value for  $p$ , and the null hypothesis would be rejected.

**Submit****Scenario: Increase in Spam Email at Work**

For testing the second figure in the report, let  $p$  be the proportion of email users who feel that spam has increased in their work email. The second set of hypotheses that the students wants to test, is then:

$$H_0: p = 0.29$$

$$H_a: p \neq 0.29$$

Based upon the data collected by this student, a 95% confidence interval for  $p$  was found to be: (0.273, 0.304).

**Question**

1/1 point (graded)

At the 0.05 significance level, which conclusion can be made?

- ☒ The student cannot reject  $H_0$ , since 0.29 falls within the confidence interval. ✓
- ☐ The student can reject  $H_0$ , since 0.29 falls within the confidence interval.
- ☐ The student can reject  $H_0$ , since 0.29 does not fall within the confidence interval.

- ☐ The student cannot reject  $H_0$ , since 0.29 does not fall within the confidence interval.

**Answer**

Correct:

0.29 is between 0.273 and 0.304, thus it is a plausible value for  $p$  and the null hypothesis cannot be rejected.

Submit

**Scenario: Broadband Internet Connection**

According to a study completed in 2006 by Pew Internet, 42% of all Americans had a broadband Internet connection at home. This same statistics student wanted to see if this percentage is different for students at his university.

$H_0: p = 0.42$

$H_a: p \neq 0.42$

Based upon the data the student collected, a 95% confidence interval for  $p$  was found to be: (0.439, 0.457).

**Question**

1/1 point (graded)

At the 0.05 level of significance, which conclusion can be made?

- ☐ The student cannot reject the null hypothesis, because 0.42 is a plausible value for  $p$  given the data collected.
- ☐ The student cannot reject the null hypothesis, because 0.42 is not a plausible value for  $p$  given the data collected.
- ☐ The student can reject the null hypothesis, because 0.42 is a plausible value for  $p$  given the data collected.
- ☒ The student can reject the null hypothesis, because 0.42 is not a plausible value for  $p$  given the data collected. ✓

**Answer**

Correct:

Since the entire interval is larger than 0.42, it is not a plausible value for  $p$ , and the student must reject the null hypothesis. Actually, the student would also accept the alternative hypothesis.

**Submit****Scenario: Broadband and Fixed Wireless**

According to the same Pew Internet study, 8% of those with broadband connections are using fixed wireless. Let  $p$  be the proportion of broadband users who use fixed wireless, and consider the hypotheses:

$$H_0: p = 0.08$$

$$H_a: p \neq 0.08$$

**Question**

1/1 point (graded)

If the  $p$ -value is 0.103, based upon the same data, which confidence interval could be the 95% confidence interval for  $p$ ?

☒ (0.068, 0.082) ✓☐ (0.068, 0.078)☐ (0.085, 0.096)☐ (0.098, 0.112)**Answer**

Correct:

Since  $0.103 > 0.05$ , we cannot reject the null hypothesis. Our value for  $p$  must be in the interval.

**Submit**

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