There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : p = 12\% = 0.12$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : p \neq 0.12$$

p is the population proportion of students at high large public high school that are left-handed.

$$H_0 : p = 12\% = 0.12$$
$$H_a : p \neq 0.12$$

0

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : p = 72\% = 0.72$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : p \neq 0.72$$

p is the population proportion of teenagers that that revealed that they seldom or never argue with their friends.

$H_0 : p = 0.72$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \mu = 115$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \mu > 115$$

μ is the population mean of students who are at least 30 years of age.

$$H_0 : \mu = 115$$
$$H_a : \mu > 115$$

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \mu = 12$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \mu < 12$$

μ is the population mean of grams of hemoglobin per deciliter of blood.

$$H_0 : \mu = 12$$
$$H_a : \mu < 12$$

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \sigma = 3$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \sigma > 3$$

σ is the population standard deviation of home temperatures.

$$H_0 : \sigma = 3$$
$$H_a : \sigma > 3$$

0
Comments

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

$H_0 : \sigma = 10$; $H_a : \sigma > 10$ where σ is the standard deviation of the distance jumped by the ski jumpers.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

The null hypothesis always has to contain an equal sign =, while the alternative hypothesis does not contain an equal sign.

The correct hypotheses thus interchange the expressions:

$$H_0 : p = 0.37$$
$$H_a : p > 0.37$$

$$H_0 : p = 0.37$$
$$H_a : p > 0.37$$

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

We do not need to test hypotheses about the sample statistic. We know what that is exactly. What we need to test are hypotheses about the population parameter. Also, we are only interested in whether the situation has improved, so we need a one-sided alternative hypothesis. The hypotheses should be $H_0 : p = 0.37$; $H_a : p > 0.37$.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The hypotheses need to use a population value instead of the sample value $\overline{x}$, thus $\overline{x}$ should be replaced by μ.

The correct hypotheses are then:

$$H_0 : \mu = 1000 \text{ grams}$$
$$H_a : \mu < 1000 \text{ grams}$$

$$H_0 : \mu = 1000 \text{ grams}$$
$$H_a : \mu < 1000 \text{ grams}$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The null hypothesis always has to contain an equal sign =, while the alternative hypothesis does not contain an equal sign.

Moreover, the null and alternative hypothesis should both use the same value (thus change both to the value mentioned in the correct alternative hypothesis).

The correct hypotheses thus interchange the expressions:

$$H_0 : \mu = 1000 \text{ grams}$$
$$H_a : \mu < 1000 \text{ grams}$$

$$H_0 : \mu = 1000 \text{ grams}$$
$$H_a : \mu < 1000 \text{ grams}$$

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers
?

Solution

Given:

$$n = 100$$
$$P = 0.2184 = 21.84\%$$

Result exercise 1:

$$H_0 : p = 12\% = 0.12$$
$$H_a : p \neq 0.12$$

Interpretation of the P-value: If the population proportion is equal to 0.12, then we have a chance of 21.84% of obtaining 16 left-handed students or more extreme in a sample of 100 students.

If the population proportion is equal to 0.12, then we have a chance of 21.84% of obtaining 16 left-handed students or more extreme in a sample of 100 students.

0
Comments

Have a comment? Type it here

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 100$$
$$P = 0.2184 = 21.84\%$$

Result exercise 1:

$$H_0 : p = 12\% = 0.12$$
$$H_a : p \neq 0.12$$

If the P-value is smaller than the significance level, then reject the null hypothesis.

$$P = 0.2184 > 0.10 = 10\% \Rightarrow \text{ Fail to reject } H_0$$

There is NOT convincing evidence against the null hypothesis.

No

0 Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

2.7

Solution

If the proportion of students at Yvonne's school who say they rarely or never argue with friends is really 0.72, there is a 2.91% chance of finding a sample of 150 students with a value of $\hat{p}$ that is as far from 0.72 as the sample value in either direction.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 150$$
$$P = 0.0291 = 2.91\%$$

Result exercise 2:

$$H_0 : p = 0.72$$
$$H_a : p \neq 0.72$$

If the P-value is smaller than the significance level, then reject the null hypothesis.

$$P = 0.0291 < 0.05 = 5\% \Rightarrow \text{ Reject } H_0$$

There is convincing evidence against the null hypothesis.

Yes

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 45$$
$$\overline{x} = 125.7$$
$$s = 29.8$$
$$P = 0.0101 = 1.01\%$$

Result exercise 3:

$$H_0 : \mu = 115$$
$$H_a : \mu > 115$$

Interpretation of the P-value: If the population mean is equal to 115, then we have a chance of 1.01% of obtaining a random sample with a sample mean of 125.7 or more.

If the population mean is equal to 115, then we have a chance of 1.01% of obtaining a random sample with a sample mean of 125.7 or more.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

3.0

Solution

Since the P-value is less than 0.05, we would reject the null hypothesis if $\alpha = 0.05$. Technically the P-value is larger than 0.01 so we would fail to reject the null hypothesis if $\alpha = 0.01$. However, we note that the P-value is very close to this α.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 50$$
$$\overline{x} = 11.3$$
$$s = 1.6$$
$$P = 0.0016 = 0.16\%$$

Result exercise 4:

$$H_0 : \mu = 12$$
$$H_a : \mu < 12$$

Interpretation of the P-value: If the population mean is equal to 12, then we have a chance of 0.16% of obtaining a random sample with a sample mean of 11.3 g/dl or less.

If the population mean is equal to 12, then we have a chance of 0.16% of obtaining a random sample with a sample mean of 11.3 g/dl or less.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 50$$
$$\overline{x} = 11.3$$
$$s = 1.6$$
$$P = 0.0016 = 0.16\%$$

Result exercise 4:

$$H_0 : \mu = 12$$
$$H_a : \mu < 12$$

If the P-value is smaller than the significance level, then reject the null hypothesis.

$$P = 0.0016 < 0.05 \Rightarrow \text{ Reject } H_0$$
$$P = 0.0016 < 0.01 \Rightarrow \text{ Reject } H_0$$

There is convincing evidence against the null hypothesis (for both significance levels).

There is convincing evidence against the null hypothesis.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The interpretation is incorrect, because the null hypothesis is either true or false, which means that the probability is either 0 or 1.

A correct interpretation was found in exercise 13a.

See explanation

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The interpretation is incorrect, because the null hypothesis is either true or false, which means that the probability is either 0 or 1.

Correct interpretation: Statistically significant at the $\alpha = 0.05$ level means that the probability of obtaining the sample value or a more extreme value is less than 0.05 or 5%, if the null hypothesis H_0 is true.

See explanation

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

A test is statistically significant at the $\alpha = 0.01$ level means that the probability of obtaining the sample value or a more extreme value is less than 0.01 or 1%, if the null hypothesis H_0 is true.

The probability is then also less than 0.05 or 5%, which means that the test is also statistically significant at the $\alpha = 0.05$ level.

2

A test is statistically significant at the $\alpha = 0.05$ level means that the probability of obtaining the sample value or a more extreme value is less than 0.05 or 5%, if the null hypothesis H_0 is true.

The probability could then be less than 0.01 or more than 0.01, thus it is unknown if the test is also statistically significant at the $\alpha = 0.01$ level.

Test at the 1% level could be statistically significant or not.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

Both P-values (0.0101 and 0.0016) are likely to lead us to reject the null hypothesis because they are both less than 0.05 – the typically chosen value of α. However, the *P*-value from Exercise 14 (0.0016) is much stronger evidence against the null hypothesis than the one from Exercise 13 (0.0101).

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \mu = 6.7 \text{ minutes}$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \mu < 6.7 \text{ minutes}$$

μ is the population mean response time to all accidents involving life-threatening injuries.

$$H_0 : \mu = 6.7 \text{ minutes}$$
$$H_a : \mu < 6.7 \text{ minutes}$$

0

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0 : \mu = 6.7 \text{ minutes}$$
$$H_a : \mu < 6.7 \text{ minutes}$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The mean response time is equal to 6.7 minutes, while the test indicates that it is less.

Consequence: We will assume that the response times have improved and decide that the training does not have to be improved, while in reality the training should be improved.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The mean response time is less than minutes, while the test indicates that it is not less.

Consequence: We will assume that the response times have not improved and decide that the training should be improved, while in reality the training should not be improved.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0 : \mu = 6.7 \text{ minutes}$$
$$H_a : \mu < 6.7 \text{ minutes}$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The mean response time is equal to 6.7 minutes, while the test indicates that it is less.

Consequence: We will assume that the response times have improved and decide that the training does not have to be improved, while in reality the training should be improved.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The mean response time is less than minutes, while the test indicates that it is not less.

Consequence: We will assume that the response times have not improved and decide that the training should be improved, while in reality the training should not be improved.

3

A Type I error is more serious, because the training is not improved while it should have been improved. The Type II error is less serious, because the training is improved anyway.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : p = 78\% = 0.78$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : p > 0.78$$

p is the population proportion of accidents where first responders are arriving within 8 minutes of the call.

$$H_0 : p = 0.78$$
$$H_a : p > 0.78$$

0

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0 : p = 0.78$$
$$H_a : p > 0.78$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The proportion of first responders arriving within 8 minutes of an accident is equal to 0.78, while the test indicates that it is more.

Consequence: We will assume that the response times have improved and decide that the training does not have to be improved, while in reality the training should be improved.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The proportion of first responders arriving within 8 minutes of an accident is more than 0.78, while the test indicates that it is not more.

Consequence: We will assume that the response times have not improved and decide that the training should be improved, while in reality the training should not be improved.

See explanation

Ex. 20c

Go to Page: 547 Go

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

3.7

Solution

In this setting a Type I error would be worse because the city may stop trying to improve its response times because they think they have met the goal, when in fact they haven't. More people could die.

See explanation for result.

1 Comment

SpideyPool 1 yr
with that response shouldnt type 2 be the error you are talking about?

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
1.0

Solution

Answers may vary.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \mu = \$85,000$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \mu > \$85,000$$

μ is the population mean income of those living near the restaurant.

$$H_0 : \mu = \$85,000$$
$$H_a : \mu > \$85,000$$

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$H_0 : \mu = \$85,000$$
$$H_a : \mu > \$85,000$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The mean income is equal to \$85,000, while the test indicates that it is less than \$85,000.

Consequence: We will assume that the mean income is smaller than we need and thus we will decide not the open the restaurant at this location, while it was a good location for your restaurant.

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The mean income is less than \$85,000, while the test indicates that it is equal to \$85,000.

Consequence: We will assume that the mean income is equal to the required limit and thus we will decide to open the restaurant at this location, while it is not a good location for your restaurant.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The opening of a restaurant requires a large investment and thus making the wrong decision could cost a lot of money, then it is best to pick the smallest level of significance $\alpha = 0.01$ in order to try to minimize the probability of making the wrong conclusions.

$$\alpha = 0.01$$

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative hypothesis use the symbol for the population value.

Proportion: p
Mean: μ
Standard deviation: σ

The null hypothesis states that the population value is equal to the value mentioned in the claim:

$$H_0 : \mu = 130$$

The alternative hypothesis states the opposite of the null hypothesis (according to the claim).

$$H_a : \mu > 130$$

μ is the population mean systolic pressure of an individual.

$$H_0 : \mu = 130$$
$$H_a : \mu > 130$$

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0: \mu = 130$$
$$H_a: \mu > 130$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The mean systolic pressure is equal to 130, while the test indicates that it is greater than 130.

Consequence: The individual will be informed that they have a high blood pressure, while they do not have a high blood pressure. Actions against a high blood pressure will be taken, while they should not be taken.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The mean systolic pressure is greater than 130, while the test indicates that it is equal to 130.

Consequence: The individual will be informed that they have a normal blood pressure, while they have a high blood pressure. Actions against the high blood pressure will not be taken, while they should be taken.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0 : \mu = 130$$
$$H_a : \mu > 130$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The mean systolic pressure is equal to 130, while the test indicates that it is greater than 130.

Consequence: The individual will be informed that they have a high blood pressure, while they do not have a high blood pressure. Actions against a high blood pressure will be taken, while they should not be taken.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The mean systolic pressure is greater than 130, while the test indicates that it is equal to 130.

Consequence: The individual will be informed that they have a normal blood pressure, while they have a high blood pressure. Actions against the high blood pressure will not be taken, while they should be taken.

3

A Type II error is more serious, because if no actions are taken against a high blood pressure, then the corresponding individual could die. Thus it would be better to decrease the type II error.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$\alpha = 0.05$$
$$Power = 0.78$$

The probability of making a Type I error is equal to the significance level α:

$$P(\text{Type I error}) = \alpha = 0.05$$

The probability of making a Type II error is 1 decreased by the power:

$$P(\text{Type II error}) = 1 - Power = 1 - 0.78 = 0.22$$

$$P(\text{Type I error}) = 0.05$$
$$P(\text{Type II error}) = 0.22$$

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

Given:

$$\alpha = 0.01$$

$$P(\text{Type II error}) = 0.14$$

The power of the test is 1 decreased by the probability of making a Type II error:

$$Power = 1 - P(\text{Type II error}) = 1 - 0.14 = 0.86$$

$$Power = 0.86$$

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$p = 0.10$$

$$\text{Alternative: } p = 0.08$$

$$Power = 0.64 = 64\%$$

The power is the probability of rejection the null hypothesis when the null hypothesis is false.

If the population proportion p is 0.08, then the probability of rejecting the null hypothesis $p = 0.10$ is 0.64 or 64%.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

If you want to increase the power, then you require more information about the data, which can be obtained by increasing the number of measurement.

More measurements.

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

Solution

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

α decreases from 0.05 to 0.01 and thus the probability of making a Type I error decreases.

If the probability of making a type I error decreases, then the probability of making a type II error β increases.

Since power is 1 decreased by the probability of making a type II error

$$POWER = 1 - \beta$$

we then know that if β increases, then the POWER has to decrease.

Power decreases

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative changes from $p = 0.08$ to $p = 0.07$.

This means that the alternative is further from the null hypothesis $p = 0.10$.

Then it is easier to detect difference between the null hypothesis $p = 0.10$ and the alternative $p = 0.07$, which means that the power has increased.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$H_0 : \mu = 5$$

$$\text{Alternative: } \mu = 5.1$$

$$Power = 0.23 = 23\%$$

The power is the probability of rejection the null hypothesis when the null hypothesis is false.

If the population mean μ is 5.1, then the probability of rejecting the null hypothesis $\mu = 5$ is 0.32 or 32%.

See explanation

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

If you want to increase the power, then you require more information about the data, which can be obtained by increasing the number of measurement.

More measurements.

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

Solution

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

α increases from 0.05 to 0.10 and thus the probability of making a Type I error increases.

If the probability of making a type I error increases, then the probability of making a type II error β decreases.

Since power is 1 decreased by the probability of making a type II error

$$POWER = 1 - \beta$$

we then know that if β decreases, then the POWER has to increase.

Power increases

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The alternative changes from $\mu = 5.1$ to $\mu = 5.2$.

This means that the alternative is further from the null hypothesis $\mu = 5$.

Then it is easier to detect difference between the null hypothesis $\mu = 5$ and the alternative $\mu = 5.2$, which means that the power has increased.

Power increases.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

Answer: d

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

Answer: b

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

Answer: a

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

Answer: b

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

First, we need to find the proportion of mathematics degrees earned by women.

$$\begin{aligned} P(\text{degree earned by a woman}) &= 0.73(0.48) + 0.21(0.42) + 0.06(0.29) \\ &= 0.3504 + 0.0882 + 0.0174 \\ &= 0.4560 \end{aligned}$$

Since 16,701 degrees were awarded and 45.6% of these degrees were awarded to women, approximately 7616 mathematics degrees were awarded to women.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$P(bachelor) = 73\% = 0.73$$
$$P(master) = 21\% = 0.21$$
$$P(doctorate) = 6\% = 0.06$$
$$P(women|bachelor) = 48\% = 0.48$$
$$P(women|master) = 42\% = 0.42$$
$$P(women|doctorate) = 29\% = 0.29$$

Determine the proportion of women that earn each degree:

$$P(\text{women and bachelor}) = P(women|bachelor) \times P(bachelor) = 0.48 \times 0.73 = 0.3504$$
$$P(\text{women and master}) = P(women|master) \times P(master) = 0.42 \times 0.21 = 0.0882$$
$$P(\text{women and doctorate}) = P(women|doctorate) \times P(doctorate) = 0.29 \times 0.06 = 0.0174$$

Add the corresponding probabilities:

$$P(women) = 0.3504 + 0.0882 + 0.0174 = 0.4560 = 45.60\%$$

Since the probabilities $P(women|master) = 42\% = 0.42$ and $P(women) = 0.4560 = 45.60\%$ are not the same, the corresponding events are NOT independent (probabilities should be equal for independent events).

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 31a:

$$P(women) = 0.4560$$

Complement rule:

$$P(\text{ not } A) = 1 - P(A)$$

We can then determine the probability of individuals who earned a degree but are not women:

$$P(\text{ not women}) = 1 - P(women) = 1 - 0.4560 = 0.5440$$

Multiplication rule (for independent events):

$$P(A \text{ and } B) = P(A) \times P(B)$$

We can then determine the probability of obtaining 2 individuals who earned a degree but are not women.

$$P(2 \text{ not women}) = P(\text{ not women}) \times P(\text{ not women}) = 0.5440 \times 0.5440 = 0.295936$$

Using the complement rule, we can then determine the probability of at least 1 degree earned by women:

$$P(\text{at least 1 women out of 2}) = 1 - P(2 \text{ not women}) = 1 - 0.295936 = 0.704064 = 70.4064\%$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The result of at least 19 out of 20 surveys (which corresponds with 95%) do not have to be in the same margin of results as this survey, because this survey could give results that are not accurate for the entire population.

The correct interpretation would be that about 19 of the 20 samples (95%) have confidence intervals that contain the true population proportion.

Moreover, it could also be less than 19 surveys that contain the true population proportion, thus the expression AT LEAST is also incorrect.

See explananation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$n = 100$$

$$p = 12\% = 0.12$$

Conditions for carrying out a one-sample z test: Random, Normal and Independent

Random: Satisfied, because the sample is a simple random sample (SRS).

Normal: The distribution can be assumed to be normal if the number of failures $n(1-p)$ and the number of successes np are both greater than 10.

$$np = 100 \times 0.12 = 12$$

$$n(1-p) = 100 \times (1 - 0.12) = 88$$

Both are greater than 10, thus the normal requirement is satisfied.

Independent: Can be assumed, because the sample size (100) is less than 10% of the population size.

Thus all conditions are satisfied.

All conditions have been met.

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$n = 150$$

$$p = 72\% = 0.72$$

Conditions for carrying out a one-sample z test: Random, Normal and Independent

Random: Satisfied, because the sample is a simple random sample (SRS).

Normal: The distribution can be assumed to be normal if the number of failures $n(1-p)$ and the number of successes np are both greater than 10.

$$np = 150 \times 0.72 = 108$$

$$n(1-p) = 150 \times (1 - 0.72) = 42$$

Both are greater than 10, thus the normal requirement is satisfied.

Independent: Can be assumed, because the sample size (150) is less than 10% of the population size (if the high school contains more than 1500 students).

Thus all conditions are satisfied, if the high school contains more than 1500 students.

All conditions have been met, if the high school contains more than 1500 students..

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$n = 10$$

$$p = 0.5$$

Conditions for carrying out a one-sample z test: Random, Normal and Independent

Normal: The distribution can be assumed to be normal if the number of failures $n(1-p)$ and the number of successes np are both greater than 10.

$$np = 10 \times 0.5 = 5$$

$$n(1-p) = 10 \times (1 - 0.5) = 5$$

Both are smaller than 10, thus the normal requirement is not satisfied.

Since the normal requirement is not satisfied, the one-sample z test can not be safely carried out.

Normal requirement not satisfied.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
1.0

Solution

The expected number of failures is less than 10. $n(1-p_0)=2$, so the Normal condition will not be met.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 100$$

$$p = 12\% = 0.12$$

$$x = 16$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{16}{100} = 0.16$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.16 - 0.12}{\sqrt{\frac{0.12(1-0.12)}{100}}} \approx 1.23$$

$$z \approx 1.23$$

0
Comments

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 100$$

$$p = 12\% = 0.12$$

$$x = 16$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{16}{100} = 0.16$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.16 - 0.12}{\sqrt{\frac{0.12(1-0.12)}{100}}} \approx 1.23$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z < -1.23 \text{ or } Z > 1.23) = 2 \times P(Z < -1.23) = 2 \times 0.1093 = 0.2186$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 150$$

$$p = 72\% = 0.72$$

$$x = 96$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{96}{150} = 0.64$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.64 - 0.72}{\sqrt{\frac{0.72(1-0.72)}{150}}} \approx -2.18$$

$$z \approx -2.18$$

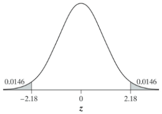
0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

Since this is a two-sided test, the P-value is $2P(z < -2.18) = 2(0.0146) = 0.0292$.



See explanation for result.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p = 0.05$$
$$H_a : p > 0.05$$
$$z = 2.19$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z > 2.19) = P(Z < -2.19) = 0.0143$$

If the P-value is less than the significance level, then reject the null hypothesis H_0.

$$P = 0.0143 < 0.05 = 5\% \Rightarrow \text{ Reject } H_0$$
$$P = 0.0143 > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

Reject H_0 at the 5% significance level
Fail to reject H_0 at the 1% significance level

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p = 0.05$$
$$H_a : p \neq 0.05$$
$$z = 2.19$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z < -2.19 \text{ or } Z > 2.19) = 2 \times P(Z < -2.19) = 2 \times 0.0143 = 0.0286$$

If the P-value is less than the significance level, then reject the null hypothesis H_0.

$$P = 0.0286 < 0.05 = 5\% \Rightarrow \text{ Reject } H_0$$
$$P = 0.0286 > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

Reject H_0 at the 5% significance level
Fail to reject H_0 at the 1% significance level

0

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

1

Since this is a one-sided test, the P-value is $P(z < -1.78) = 0.0375$. The P-value is less than 0.05 so we would reject the null hypothesis at the 5% significance level. But the P-value is greater than 0.01 so we would fail to reject the null hypothesis at the 1% significance level.

See explanation for result.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p = 0.65$$
$$H_a : p \neq 0.65$$
$$z = -1.78$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z < -1.78 \text{ or } Z > 1.78) = 2 \times P(Z < -1.78) = 2 \times 0.0375 = 0.0750$$

If the P-value is less than the significance level, then reject the null hypothesis H_0.

$$P = 0.0750 > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$
$$P = 0.0750 > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

Fail to reject H_0 at both significance levels

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

State: We want to perform a test at the $\alpha = 0.05$ significance level of $H_0: p = 0.37$ versus $H_a: p > 0.37$ where p is the actual proportion of students who are satisfied with the parking situation. *Plan*: If conditions are met, we should do a one-sample z test for the population proportion p. Random: The sample was randomly selected. Normal: The expected number of successes $np_0 = 200(0.37) = 74$ and failures $n(1-p_0) = 200(0.63) = 126$ are both at least 10. Independent: There were 200 in the sample and since there are 2500 students in the population, the sample is less than 10% of the population. All conditions have been met. *Do*: The sample proportion is $\hat{p} = \frac{83}{200} = 0.415$. The corresponding test statistic is $z = \frac{0.415 - 0.37}{\sqrt{\frac{0.37(0.63)}{200}}} = 1.32$. Since this is a one-sided test the P-value is $P(z > 1.32) = 0.0934$. *Conclude*: Since our P-value is greater than 0.05, we fail to reject the null hypothesis. We do not have enough evidence to conclude that the new parking arrangement increased student satisfaction with parking at this school.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 300$$
$$p = 10\% = 0.10$$
$$x = 25$$

Determine the hypotheses:

$$H_0 : p = 10\% = 0.10$$
$$H_a : p < 0.10$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{25}{300} \approx 0.0833$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.0833 - 0.10}{\sqrt{\frac{0.10(1-0.10)}{300}}} \approx -0.96$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z < -0.96) = 0.1685$$

If the P-value is less than the significance level, then reject the null hypothesis H_0

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

Given:

$$n = 200$$
$$p = 37\% = 0.37$$
$$x = 83$$

Determine the hypotheses:

$$H_0 : p = 37\% = 0.37$$
$$H_a : p > 0.37$$

Type I error: Reject H_0, when H_0 is true.

Interpretation: The proportion of students who approved of the parking that was provided is equal to 0.37, while it appears to be more than 0.37.

Consequence: The change appears to be effective, while it was not effective. Thus no improvements will be made, while it might still be necesarry.

2

Type II error: Fail to reject H_0, when H_0 is false.

Interpretation: The proportion of students who approved of the parking that was provided is more than 0.37, while it appears to be equal to 0.37.

Consequence: The change appears to not be effective, while it was not effective. Thus improvements will be made, while it was no longer necessary.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 200$$
$$p = 37\% = 0.37$$
$$x = 83$$
$$Power = 0.75$$
$$\text{Alternative} : p = 0.45$$

Determine the hypotheses:

$$H_0 : p = 37\% = 0.37$$
$$H_a : p > 0.37$$

The power is the probability of rejecting the null hypothesis when the alternative hypothesis is true.

If the true population proportion is 0.45, then the probability of rejecting the null hypothesis is 0.75 or 75%.

If the true population proportion is 0.45, then the probability of rejecting the null hypothesis is 0.75 or 75%.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

You can increase the power by:

Increasing the sample size (because having more information about the population will allow us to make better estimations).

Increase the significance level (because this increases the probability of making a Type I error and decreases the probability of making a Type II error; Since the power is 1 decreased by the probability of making a Type II error and thus the power increases).

Making the alternative proportion p more extreme (thus p greater than 0.45, since more extreme alternatives are easier to prove).

Increasing the sample size
Increase the significance level
Making the alternative proportion p more extreme

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
3.0

Solution

A Type I error would be rejecting the null hypothesis when it is really true. In this case that would mean concluding that less than 10% of patients would suffer nausea on the drug when, in reality, at least 10% would. *Consequence:* The new drug is used on more Alzheimer's patients, leading to excess nausea. A Type II error would be failing to reject the null hypothesis when it is false. In this case we would say that we do not have enough evidence to conclude that less than 10% would suffer from nausea when in fact less than 10% would. *Consequence:* The new drug is used on fewer Alzheimer's patients due to concerns about the side effect of nausea.

See explanation for result.

There are 3 solutions for this exercise.
Please see your textbook for the exercise prompt.

Cynthia He

5.0

Solution

1

If the true proportion is 0.07, we will correctly reject the null about 54% of the time.

See explanation for result.

1 Comment

teaspoon 1 yr
You're not LittleTurtle 0_o

Have a comment? Type it here ...

Submit

LittleTurtle

5.0

There are 3 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

4.3

Solution

We can increase the power either by increasing the sample size or by increasing the significance level.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

All first-born children, because the sample contains ONLY first-born children and first born children are NOT representative for all children.

All first-born children

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

Solution

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 25468$$
$$p = 50\% = 0.5$$
$$x = 13173$$

Determine the hypotheses:

$$H_0 : p = 50\% = 0.50$$
$$H_a : p > 0.50$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{13173}{25468} \approx 0.5172$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.5172 - 0.5}{\sqrt{\frac{0.5(1-0.5)}{25468}}} \approx 5.49$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z > 5.49) = 1 - P(Z < 5.49) = 1 - 0.9999 = 0.0001$$

If the P-value is less than the significance level, then reject the null hypothesis H_0.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Drinking one type of coffee first, might change the taste of the other type of coffee and thus it is best that some people will get the first type of coffee first, while the others get the second type of coffee first.

See explanation

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

State: We want to perform a test of $H_0: p = 0.50$ versus $H_a: p > 0.50$ where p is the actual proportion of coffee drinkers who prefer fresh-brewed. We will perform the test at the $\alpha = 0.05$ significance level. *Plan*: If conditions are met, we should do a one-sample z test for the population proportion p. Random: The sample was randomly selected. Normal: The expected number of successes $np_0 = 50(0.50) = 25$ and failures $n(1 - p_0) = 50(0.50) = 25$ are both at least 10. Independent: There were 50 coffee drinkers from a small city in the sample. There are likely many more than 500 coffee drinkers in that small city so the sample is less than 10% of the population. All conditions have been met. *Do*: The sample proportion is $\hat{p} = \frac{36}{50} = 0.72$. The corresponding test statistic is $z = \frac{0.72 - 0.50}{\sqrt{\frac{0.50(0.50)}{50}}} = 3.11$. Since this is a one-sided test the *P*-value is $P(z > 3.11) = 0.0009$. *Conclude*: Since our *P*-value is much smaller than 0.05, we reject the null hypothesis. It appears that coffee drinkers in this small city prefer fresh-brewed coffee over instant coffee.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 558$$
$$p = \frac{3}{4} = 0.75$$
$$x = 445$$

Conditions: Normal, Independent, Random. They are met, because the number of successes $(558 \times 0.75 = 418.5)$ and failures $(558 \times (1 - 0.75) = 139.5)$ are both greater than 10 (corrected), the sample size is less than 10% of the population (corrected) and the sample is a random sample.

Determine the hypotheses:

$$H_0 : p = 0.75$$
$$H_a : p > 0.75 (corrected)$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{445}{558} \approx 0.7975$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.7975 - 0.75}{\sqrt{\frac{0.75(1-0.75)}{558}}} \approx 2.59 (corrected)$$

The P-value is the probability of obtaining the value of the test statistic, or

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle 5.0

Solution

The corrections are given here. Let p = the true proportion of heads when tossing the coin. $H_0: p = 0.5$ and $H_a: p \neq 0.5$. Check conditions: Random: We'll assume that the tosses were random. Normal: The expected number of successes $np_0 = 4040(0.5) = 2020$ and failures $n(1-p_0) = 4040(0.5) = 2020$ are both at least 10. Independent: The outcomes of individual coin tosses should be independent if the tosses are random. We aren't sampling without replacement, so we don't need to check the 10% condition. The conditions are satisfied. For this sample we have $\hat{p} = \frac{2048}{4040} = 0.5069$ so $z = \frac{0.5069 - 0.5}{\sqrt{\frac{(0.5)(0.5)}{4040}}} = 0.88$. Since this is a two-sided test, the P-value is $2P(z > 0.88) = 2(0.1894) = 0.3788$. The P-value is not small enough to reject the null hypothesis. We do not have enough evidence to say that the coin is unbalanced.

See explanation for result.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

Given:

$$n = 125$$
$$p = 60\% = 0.60$$
$$x = 86$$

Determine the hypotheses:

$$H_0 : p = 60\% = 0.60$$
$$H_a : p \neq 0.60$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{86}{125} \approx 0.688$$

Determine the value of the test-statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.688 - 0.60}{\sqrt{\frac{0.60(1-0.60)}{125}}} \approx 2.01$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. Determine the P-value using table A:

$$P = P(Z < -2.01 \text{ or } Z > 2.01) = 2 \times P(Z < -2.01) = 2 \times 0.0222 = 0.0444$$

If the P-value is less than the significance level, then reject the null hypothesis

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle 5.0

Solution

State: We want to perform a test of $H_0: p = 0.73$ versus $H_a: p \neq 0.73$ where p is the actual proportion of first-year college students who think being very well-off financially is an important personal goal. We will perform the test at the $\alpha = 0.05$ significance level. *Plan*: If conditions are met, we should do a one-sample z test for the population proportion p. Random: The sample was randomly selected. Normal: The expected number of successes $np_0 = 200(0.73) = 146$ and failures $n(1-p_0) = 200(0.27) = 54$ are both at least 10. Independent: There were 200 first-year students from this state university in the sample. There are likely many more than 2000 first-year students in the university overall so the sample is less than 10% of the population. All conditions have been met. *Do*: The sample proportion is $\hat{p} = \frac{132}{200} = 0.66$. The corresponding test statistic is $z = \frac{0.66 - 0.73}{\sqrt{\frac{0.73(0.27)}{200}}} = -2.23$.

Since this is a two-sided test the P-value is $2P(z < -2.23) = 2(0.0129) = 0.0258$. *Conclude*: Since our P-value less than 0.05, we reject the null hypothesis. It appears that a proportion other than 0.73 of first-year students at this university think that being very well-off financially is an important goal.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 125$$
$$p = 60\% = 0.60$$
$$x = 86$$
$$c = 95\%$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{86}{125} = 0.688$$

For confidence level $1 - \alpha = 0.95$, determine $z_{\alpha/2} = z_{0.025}$ using table II (look up 0.025 in the table, the z-score is then the found z-score with opposite sign):

$$z_{\alpha/2} = 1.96$$

The margin of error is then:

$$E = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 1.96 \times \sqrt{\frac{0.688(1-0.688)}{125}} \approx 0.0812$$

The confidence interval then becomes:

$$0.6068 = 0.688 - 0.0812 = \hat{p} - E < p < \hat{p} + E = 0.688 + 0.0812 = 0.7692$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 51a:

$$0.6068 < p < 0.7692$$

The confidence interval does not contains 60% (or 0.60) which is what the DMV claimed. Thus there is sufficient evidence to reject the DMV's claim.

There is sufficient evidence to reject the DMV's claim.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

State: We want to estimate the actual proportion of first-year college students at this university who identify being very well-off financially as an important personal goal at a 95% confidence level. *Plan*: We should use a one-sample z-interval for p if the conditions are satisfied. Random: the college students were selected randomly. Normal: there were 132 successes (had this goal) and 68 failures (did not have this goal). Both are at least 10. Independent: the sample is less than 10% of the population of all first-year college students at this university. The conditions are met. *Do*: A 95% confidence interval is given by

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.66 \pm 1.96\sqrt{\frac{0.66(0.34)}{200}} = 0.66 \pm 0.066 = (0.594, 0.726)$. *Conclude*: We are 95% confident that the interval from 0.594 to 0.726 captures the true proportion of first-year college students at this university who identify being very well-off financially as an important personal goal.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 52a:

$$0.5943 < p < 0.7257$$

The confidence interval does not contains 73% (or 0.73) which is the national value. Thus there is sufficient evidence to support the claim that the proportion is different (less) than the national value of 73%.

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$95\% \text{ confidence interval: } (0.167, 0.213)$$

$$p = 0.20$$

The confidence interval contains $p = 0.20$, which indicates that the true population proportion does not differ from 0.20.

No

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$\hat{p} = 59\% = 0.59$$

$$95\% \text{ confidence} : E = 3\% = 0.03$$

$$p = 0.55$$

The confidence interval is then:

$$0.56 = 0.59 - 0.03 = \hat{p} - E < p < \hat{p} + E = 0.59 + 0.03 = 0.62$$

The confidence interval does not contain $p = 0.55$, which indicates that the actual proportion differs from 0.5.

Yes

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The parameter of interest is p = the true proportion of teens who think that young people should wait to have sex until marriage.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$n = 439$$

$$p = 0.5$$

Conditions for carrying out a one-sample z test: Random, Normal and Independent

Random: Satisfied, because the sample is a random sample.

Normal: The distribution can be assumed to be normal if the number of failures $n(1-p)$ and the number of successes np are both greater than 10.

$$np = 439 \times 0.5 = 219.5$$

$$n(1-p) = 439 \times (1-0.5) = 219.5$$

Both are greater than 10, thus the normal requirement is satisfied.

Independent: Can be assumed, because the sample size (439) is less than 10% of the population size.

Thus all conditions are satisfied.

All conditions have been met.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sasha R.

5.0

Solution

c) There is a 1.1% chance, assuming it is true that 50% of teens think young people should wait until marriage for sex, that a sample like this one would produce a difference from 50% that was this extreme or more extreme.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

1.0

Solution

Yes. Since the *P*-value is less than 0.05, we reject the null hypothesis and conclude that the actual proportion of teens who think that young people should wait is not 0.50.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The parameter of interest is p = the true proportion of teens who would be willing to report cheating by other students.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

1

Random: The sample was randomly selected. Normal: The expected number of successes $np_0 = 172(0.15) = 25.8$ and failures $n(1-p_0) = 172(0.85) = 146.2$ are both at least 10. Independent: There were 172 undergraduates at a large university sampled. This is clearly less than 10% of all undergraduates at this university.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

P-value is given in the output as:

$$P = 0.146 = 14.6\%$$

The P-value is the probability of obtaining a sample that contains a more extreme proportion that the given sample proportion, if the null hypothesis is true.

If the population proportion is 0.15, then the probability of obtaining a sample that contains a more extreme proportion that the given sample proportion is 0.146 or 14.6%.

If the population proportion is 0.15, then the probability of obtaining a sample that contains a more extreme proportion that the given sample proportion is 0.146 or 14.6%.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$H_0 : p = 0.15$$
$$H_a : p \neq 0.15$$

The significance level is 1 decreased by the confidence level:

$$\alpha = 1 - 95\% = 1 - 0.95 = 0.05$$

P-value given in the output:

$$P = 0.146$$

If the P-value is less than the significance level, then reject the null hypothesis.

$$0.146 > 0.05 \Rightarrow \text{ Fail to reject } H_0$$

There is not sufficient evidence to support the claim.

No

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 100$$

$$x = 64$$

$$p = 50\% = 0.50$$

Formula for the value of the test statistic:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

The sample proportion is the number of successes divided by the sample size:

$$\hat{p} = \frac{x}{n} = \frac{64}{100} = 0.64$$

Replacing the variables with their known values, we then obtain:

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.64 - 0.5}{\sqrt{\frac{0.5(1-0.5)}{100}}} = \frac{0.64 - 0.5}{\sqrt{\frac{0.5(0.5)}{100}}}$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The three conditions are normal, independent and random.

Random is mentioned in (a).

Independent is mentioned in (b) and (e).

Normal is mentioned in (d), but not in (c), because the population does not have to be normal, but the number of failures and the number of successes have to be greater than 10 as in (d).

(c) The population distribution should be approximately normal, unless the sample size is large.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

mathkrew

3.0

Solution

1

z-score 2.43
probability of .9925

Find the probability associated with the given z-score of 2.43

2

1-.9925=.0075
.0075*2=.015...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

2.5

Solution

Answer: b

See explanation for result.

0
Comments

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$\mu_Y = 4.2$$
$$\sigma_Y = 0.05$$
$$\mu_X = 4$$
$$\sigma_X = 0.1$$

Since the distribution for X and Y are normal, the distribution of $X - Y$ is also normal.

Properties mean and variance if X and Y are independent:

$$\mu_{aX+bY} = a\mu_X + b\mu_Y$$
$$\sigma^2_{aX+bY} = a^2\mu^2_X + b^2\mu^2_Y$$

Then we obtain for the mean and variance of $X - Y$:

$$\mu_{X-Y} = \mu_X - \mu_Y = 4 - 4.2 = -0.2$$
$$\sigma^2_{X-Y} = \mu^2_X + \mu^2_Y = 0.1^2 + 0.05^2 = 0.0125$$

The standard deviation is the square root of the variance:

$$\sigma_{X-Y} = \sqrt{\sigma^2_{X-Y}} = \sqrt{0.0125} \approx 0.1118$$

The importance of this random variable is that the CDs have to fit in the selected cases which happens if the difference in diameter $X - Y$ is negative.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 61 a:

Distribution of $X - Y$: Normal distribution with mean -0.2 and standard deviation 0.1118

The z-score is the value decreased by the mean, divided by the standard deviation:

$$z = \frac{x - \mu}{\sigma} = \frac{0 - (-0.2)}{0.1118} \approx 1.79$$

Determine the corresponding probability using table A:

$$P(X - Y < 0) = P(Z < 1.79) = 0.9633$$

$$P(X - Y < 0) = 0.9633$$

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 61b:

$$P(fit) = P(X - Y < 0) = P(Z < 1.79) = 0.9633$$

Multiplication rule if A and B are independent:

$$P(A \text{ and } B) = P(A) \times P(B)$$

Then we obtain:

$$P(\text{ 100 CDs fit}) = P(fit) \times \ldots \times P(fit) = P(fit)^{100} = 0.9633^{100} \approx 0.0238$$

$$P(\text{ 100 CDs fit}) \approx 0.0238$$

0
Comments

Have a comment? Type it here ...

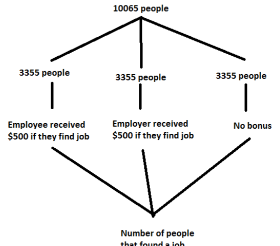
Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution



There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

Give each person in the experiment a unique number between 1 and 10065.

Choose a random line (127) from table D

Select the first 5-digit number.

If the number is between 00001 and 10065, then select the corresponding person for treatment 1, else ignore the number and move on to the next 5-digit number.

The first three numbers starting from line 127 in table D that are between 00001 and 10065 are: 06565, 00795 and 08727.

Thus person 6565, 795 and 8727 are selected from treatment 1.

Person 6565, 795 and 8727

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

A control group is used to eliminate outside effects that can be due to chance, the environment, the employers, etc.

See explanation

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

Solution

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Conditions for carrying out a significance test: Random, Normal and Independent.

Random: Satisfied, because the sample is a sample random sample (SRS)

Normal: Satisfied, because the sample size of 45 is large (30 or more) and thus the distribution can be assumed to be approximately normal.

Independent: Satisfied, because the sample size of 45 is less than 10% of the population size.

Thus all three conditions were satisfied.

Conditions have been met.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

Random: The sample was randomly selected. Normal: The sample size is at least 30. Independent: The sample size was 50 and there are clearly more than 500 children in Jordan so the sample is less than 10% of the population.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Conditions for carrying out a significance test: Random, Normal and Independent.

Normal requirement is NOT satisfied, because the sample size of 20 is less than 30 and the distribution is left-skewed (because the highest bar in the histogram is to the right).

Normal requirement has not been met

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

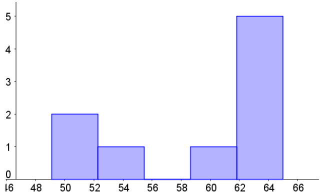
?

Solution

1

Create a histogram

The width of the bars has to be equal and the height has to be equal to the frequency.



2

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The test statistic is $t = \frac{125.7 - 115}{29.8/\sqrt{45}} = 2.409$.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle
5.0

Solution

Using Table B and 40 df (there are no entries for 44 df), we find the following bounds on the *P*-value: $0.01 < P\text{-value} < 0.02$. Using technology the *P*-value is 0.0101.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The test statistic is $t = \frac{11.3 - 12}{1.6/\sqrt{50}} = -3.094$.

See explanation for result.

0 Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

Using Table B and 40 df (there are no entries for 49 df), we find the following bounds on the P-value: $0.001 < P\text{-value} < 0.0025$. Using technology the P-value is 0.0016.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 20$$
$$t = 1.81$$

Determine the hypotheses:

$$H_0 : \mu = 5$$
$$H_a : \mu > 5$$

(i) The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $df = n - 1 = 20 - 1 = 19$:

$$0.025 < P < 0.05$$

(ii) Command for the Ti-83/Ti-84 calculator: tcdf(1.818,1E99,19).

$$P = 0.0424336273$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P < 0.05 = 5\% \Rightarrow \text{ Reject } H_0$$
$$P > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 20$$
$$t = 1.81$$

Determine the hypotheses:

$$H_0 : \mu = 5$$
$$H_a : \mu \neq 5$$

(i) The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $df = n - 1 = 20 - 1 = 19$:

$$0.05 < 2 \times 0.025 < P < 2 \times 0.05 = 0.10$$

(ii) Command for the Ti-83/Ti-84 calculator: 2 * tcdf(1.818,1E99,19).

$$P = 0.0848672546$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$
$$P > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 25$$
$$t = -1.12$$

Determine the hypotheses:

$$H_0 : \mu = 64$$
$$H_a : \mu \neq 64$$

(i) The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $df = n - 1 = 25 - 1 = 24$:

$$0.20 < 2 \times 0.10 < P < 2 \times 0.15 = 0.30$$

(ii) Command for the Ti-83/Ti-84 calculator: 2 * tcdf(-1E99,-1.12,24).

$$P = 0.2737972632$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$
$$P > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 25$$
$$t = -1.12$$

Determine the hypotheses:

$$H_0 : \mu = 64$$
$$H_a : \mu < 64$$

(i) The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $df = n - 1 = 25 - 1 = 24$:

$$0.10 < P < 0.15$$

(ii) Command for the Ti-83/Ti-84 calculator: tcdf(-1E99,-1.12,24).

$$P = 0.1368986316$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$
$$P > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

The mean is the sum of all values divided by the number of values:

$$\overline{x} = \frac{2.0 + 0.4 + \ldots + 1.1 + 2.3}{10} = 1.02$$

n is the number of values in the sample.

The standard deviation is the square root of the sum of squared deviations from the mean divided by $n - 1$.

$$s = \sqrt{\frac{(2.0 - 1.02)^2 + \ldots + (2.3 - 1.02)^2}{10 - 1}} \approx 1.1961$$

2

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

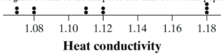
LittleTurtle

5.0

Solution

State: We want to perform a test of $H_0: \mu = 1$ versus $H_a: \mu > 1$ where μ is the actual mean amount of heat conductivity for this type of glass. We will perform the test at the $\alpha = 0.05$ significance level. *Plan*: If conditions are met, we should do a one-sample t test for the population mean μ.

Random: The sample was randomly selected. Normal: There were only 11 pieces sampled so we need to examine the sample data. The dotplot below indicates that there is not much skewness and no outliers. Independent: There were 11 pieces of glass in the sample. There are likely many more than 110 pieces of glass overall so the sample is less than 10% of the population. All conditions have been met.



Do: The sample mean and standard deviation are: $\bar{x} = 1.1182$ and $s_x = 0.0438$. The corresponding test statistic is $t = \dfrac{1.1182 - 1}{0.0438/\sqrt{11}} = 8.95$. Since this is a one-sided test with df = 10, the P-value is $P(t > 8.95) \approx 0$. *Conclude*: Since our P-value less than 0.05, we reject the null hypothesis. It appears that this glass has a mean heat conductivity greater than 1.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Outliers are more than 1.5IQR below the first quartile Q_1 or above the third quartile Q_3.

The interquartile range is the difference between the third and first quartile:

$$IQR = Q_3 - Q_1 = 1090.5 - 632.3 = 458.2$$

Determine the boundaries outside which the outliers lie:

$$Q_1 - 1.5IQR = 632.3 - 1.5(458.2) = -55$$
$$Q_3 + 1.5IQR = 1090.5 + 1.5(458.2) = 1777.8$$

Then we note that the minimum (374.0) and maximum (1425.0) lie within these boundaries, thus there are no outliers.

No outliers

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

P-value given in the output:

$$P - value = 0.000$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme, if the null hypothesis is true.

If the population mean daily calcium intake for women between the ages of 18 and 24 years is 1200 milligrams, then the probability of obtaining a sample of 36 women with a mean intake of 856.2 (or more extreme) is almost zero.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$H_0 : \mu = 1200$$
$$H_a : \mu < 1200$$

P-value given in the output:

$$P - value = 0.000$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P < 0.05 = 5\% \Rightarrow \text{ Reject } H_0$$

There is sufficient evidence to support the claim.

There is sufficient evidence to support the claim.

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Outliers are more than 1.5IQR below the first quartile Q_1 or above the third quartile Q_3.

The interquartile range is the difference between the third and first quartile:

$$IQR = Q_3 - Q_1 = 1.543 - (-3.418) = 4.961$$

Determine the boundaries outside which the outliers lie:

$$Q_1 - 1.5IQR = -3.418 - 1.5(4.961) = -10.8595$$
$$Q_3 + 1.5IQR = 1.543 + 1.5(4.961) = 8.9845$$

Then we note that the minimum (-10.27) and maximum (7.34) lie within these boundaries, thus there are no outliers.

No outliers

0
Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

P-value given in the output:

$$P - value = 0.003$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme, if the null hypothesis is true.

If the population mean gain on the stocks is equal to 0.95% per month, then the probability of obtaining a sample of 36 weeks with a mean intake of -1.441 (or more extreme) is 0.003 or 0.3%.

See explanation

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

$$H_0: \mu = 0.95$$
$$H_a: \mu < 0.95$$

P-value given in the output:

$$P - value = 0.003$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P < 0.05 \Rightarrow \text{ Reject } H_0$$

There is sufficient evidence to support the claim.

There is sufficient evidence to support the claim.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 10$$
$$\overline{x} = 0.34$$
$$s = 0.83$$

Determine the hypotheses:

$$H_0 : \mu = 0$$
$$H_a : \mu > 0$$

Determine the value of the test statistic:

$$t = \frac{\overline{x} - \mu_0}{s/\sqrt{n}} = \frac{0.34 - 0}{0.83/\sqrt{10}} = 1.295$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $n - 1 = 10 - 1 = 9$:

$$0.10 < P < 0.15$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P > 0.05 \Rightarrow \text{ Fail to reject } H_0$$

There is not sufficient evidence to support the claim.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$n = 30$$
$$\overline{x} = 137$$
$$s = 45$$

Determine the hypotheses:

$$H_0 : \mu = 2.5 \text{ hours} = 150 \text{ minutes}$$

$$H_a : \mu < 150$$

Determine the value of the test statistic:

$$t = \frac{\overline{x} - \mu_0}{s/\sqrt{n}} = \frac{137 - 150}{45/\sqrt{30}} = -1.582$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $n - 1 = 30 - 1 = 29$:

$$0.05 < P < 0.10$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$

There is not sufficient evidence to support the claim.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

1.0

Solution

A Type I error is committed when the experts conclude that Variety A has a higher mean yield when it actually doesn't.. A Type II error is committed when the experts conclude that there is no mean difference in yields when in fact Variety A has a higher mean yield.. Since we failed to reject the null hypothesis in Exercise 75, we may have committed a Type II error.

See explanation for result.

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

You can increase the power by:

Increasing the sample size (because having more information about the population will allow us to make better estimations).

Increase the significance level (because this increases the probability of making a Type I error and decreases the probability of making a Type II error; Since the power is 1 decreased by the probability of making a Type II error and thus the power increases).

Decrease the standard deviation (because the less the variation, the more powerful the test will be).

Increasing the sample size
Increase the significance level
Decrease the standard deviation

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

$$H_0 : \mu = 2.5$$
$$H_a : \mu < 2.5$$

Type I error: reject the null hypothesis, when the null hypothesis is true.

Interpretation: Students study on average 2.5 hours per night, while the test indicates that they study less.

Type II error: fail to reject the null hypothesis, when the null hypothesis is false.

Interpretation: Students study on average less than 2.5 hours per night, while the test indicates that they study 2.5 hours per night.

2

In exercise 76, we failed to reject the null hypothesis and thus we could have made a Type II error, but not a Type I error.

Type II error

0
Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

You can increase the power by:

Increasing the sample size (because having more information about the population will allow us to make better estimations).

Increase the significance level (because this increases the probability of making a Type I error and decreases the probability of making a Type II error; Since the power is 1 decreased by the probability of making a Type II error and thus the power increases).

Decrease the standard deviation (because the less the variation, the more powerful the test will be).

2

Thus $\alpha = 0.10$ will have the highest power.

$$\boxed{\alpha = 0.10}$$

0
Comments

There are 2 solutions for this exercise.

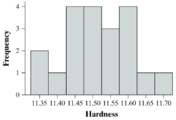
Please see your textbook for the exercise prompt.

LittleTurtle

4.0

Solution

State: We want to perform a test of $H_0: \mu = 11.5$ versus $H_a: \mu \neq 11.5$ where μ is the actual mean hardness of the tablets. We will perform the test at the $\alpha = 0.05$ significance level. *Plan*: If conditions are met, we should do a one-sample t test for the population mean μ. Random: The tablets were selected randomly. Normal: The sample size was 20, so we use a histogram to check for skewness and outliers. The histogram given below indicates that the distribution is roughly symmetric and does not have outliers. Independent: There were 20 tablets in the sample. This is less than 10% of all possible tablets produced. All conditions have been met.



Do: The sample mean and standard deviation are: $\bar{x} = 11.516$ and $s_x = 0.095$. Using technology, the

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

The mean is the sum of all values divided by the number of values:

$$\overline{x} = \frac{299.4 + 297.7 + 301.0 + 298.9 + 300.2 + 297.0}{6} \approx 299.0333$$

n is the number of values in the sample.

The standard deviation is the square root of the sum of squared deviations from the mean divided by $n-1$.

$$s = \sqrt{\frac{(299.4 - 299.0333)^2 + ... + (297.0 - 299.0333)^2}{6-1}} \approx 1.5029$$

2

Determine the hypotheses:

$$H_0 : \mu = 300$$
$$H_a : \mu \neq 300$$

Determine the value of the test statistic:

$$t = \frac{\overline{x} - \mu_0}{s/\sqrt{n}} = \frac{299.0333 - 300}{1.5029/\sqrt{6}} = -1.576$$

The P-value is the probability of obtaining the value of the test statistic, or a value more extreme. The P-value is the number (or interval) in the column title of Table B containing the t-value in the row $df = n - 1 = 20 - 1 = 19$:

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

The mean is the sum of all values divided by the number of values:

$$\overline{x} = \frac{11.627 + 11.613 + ... + 11.472 + 11.531}{20} \approx 11.5164$$

n is the number of values in the sample.

The standard deviation is the square root of the sum of squared deviations from the mean divided by $n-1$.

$$s = \sqrt{\frac{(11.627 - 11.5164)^2 + ... + (11.531 - 11.5164)^2}{20 - 1}} \approx 0.0950$$

2

Determine the t-value by looking in the row starting with degrees of freedom $n - 1 = 20 - 1 = 19$ and the column with $c = 95\%$ in table B:

$$t^* = t_{\alpha/2} = t_{0.025} = 2.093$$

The margin of error is then:

$$E = t_{\alpha/2} \times \frac{s}{\sqrt{n}} = 2.093 \times \frac{0.0950}{\sqrt{20}} \approx 0.0445$$

The confidence interval then becomes:

$$11.4719 = 11.5164 - 0.0445 = \overline{x} - E < \mu < \overline{x} + E = 11.5164 + 0.0445 = 11.5609$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

1

The mean is the sum of all values divided by the number of values:

$$\overline{x} = \frac{299.4 + 297.7 + 301.0 + 298.9 + 300.2 + 297.0}{6} \approx 299.0333$$

n is the number of values in the sample.

The standard deviation is the square root of the sum of squared deviations from the mean divided by $n-1$.

$$s = \sqrt{\frac{(299.4 - 299.0333)^2 + ... + (297.0 - 299.0333)^2}{6-1}} \approx 1.5029$$

2

Determine the t-value by looking in the row starting with degrees of freedom $n - 1 = 6 - 1 = 5$ and the column with $c = 95\%$ in table B:

$$t^* = t_{\alpha/2} = t_{0.025} = 2.571$$

The margin of error is then:

$$E = t_{\alpha/2} \times \frac{s}{\sqrt{n}} = 2.571 \times \frac{1.5029}{\sqrt{6}} \approx 1.5775$$

The confidence interval then becomes:

$$297.4558 = 299.0333 - 1.5775 = \overline{x} - E < \mu < \overline{x} + E = 299.0333 + 1.5775 = 300.6108$$

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Determine the hypotheses

$$H_0 : \mu = 200$$

$$H_a : \mu \neq 200$$

Given 95% confidence interval:

$$(158.22, 189.64)$$

Since the confidence interval does not contain 200, there is sufficient evidence to reject the claim of a mean response time of 200 milliseconds.

Yes

0
Comments

Have a comment? Type it here ...

Submit

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Determine the hypotheses

$$H_0 : \mu = 5$$
$$H_a : \mu \neq 5$$

Given 90% confidence interval:

$$(3.794, 4.615)$$

Since the confidence interval does not contain 5, there is sufficient evidence to reject the claim of an average of five 8-ounce glasses of water per day.

Yes

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Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$H_0 : \mu = 10$$
$$H_a : \mu \neq 10$$
$$P = 0.06$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P = 0.06 > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$

A 95% confidence interval corresponds with a significance test at the 5% significance level.

Since the null hypothesis failed to reject at the 5% significance level, the 95% confidence interval contains the value given in the null hypothesis 10.

Yes

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There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$H_0 : \mu = 10$$
$$H_a : \mu \neq 10$$
$$P = 0.06$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P = 0.06 < 0.10 = 10\% \Rightarrow \text{ Fail to reject } H_0$$

A 90% confidence interval corresponds with a significance test at the 10% significance level.

Since the null hypothesis was rejected at the 10% significance level, the 95% confidence interval does not contain the value given in the null hypothesis 10.

No

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Comments

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$H_0 : \mu = 15$$

$$H_a : \mu < 15 \text{ or } H_a : \mu > 15$$

$$P = 0.03$$

The P-value of a two-sided test is twice the P-value of the corresponding one-sided test:

$$H_0 : \mu = 15$$

$$H_a : \mu \neq 15$$

$$P = 0.06$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P = 0.06 > 0.01 = 1\% \Rightarrow \text{ Fail to reject } H_0$$

A 99% confidence interval corresponds with a significance test at the 1% significance level.

Since the null hypothesis failed to reject at the 1% significance level, the 99% confidence interval contains the value given in the null hypothesis 15.

Yes

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$H_0 : \mu = 15$$
$$H_a : \mu < 15 \text{ or } H_a : \mu > 15$$
$$P = 0.03$$

The P-value of a two-sided test is twice the P-value of the corresponding one-sided test:

$$H_0 : \mu = 15$$
$$H_a : \mu \neq 15$$
$$P = 0.06$$

If the P-value is smaller than the significance level, then the null hypothesis is rejected.

$$P = 0.06 > 0.05 = 5\% \Rightarrow \text{ Fail to reject } H_0$$

A 95% confidence interval corresponds with a significance test at the 5% significance level.

Since the null hypothesis failed to reject at the 5% significance level, the 95% confidence interval contains the value given in the null hypothesis 15.

Yes

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$95\% \text{ confidence interval: } 4.2 \pm 2.3 = (1.9, 6.5)$$

Determine the hypotheses:

$$H_0 : \mu = 7$$
$$H_a : \mu \neq 7$$

Since the confidence interval does not contain 7, there is sufficient evidence to support the claim that the mean is not equal to 7 mg.

Yes

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Given:

$$95\% \text{ confidence interval: } 4.2 \pm 2.3 = (1.9, 6.5)$$

Determine the hypotheses:

$$H_0 : \mu = 5$$
$$H_a : \mu \neq 5$$

A 95% confidence interval corresponds with a significance test at the 5% significance level.

Since the confidence interval contains 5, there is not sufficient evidence to reject the claim that the mean is equal to 5 mg.

No

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Comments

Have a comment? Type it here ...

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

It is possible that the subjects perform better at the second knob than at the first knob due to experience and thus it is best to randomly assign the order of the knots to each subject.

See explanation

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Comments

Have a comment? Type it here ...

Submit

LittleTurtle

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There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Determine the difference between the values for each subject.

113	137	-24
106	106	0
130	133	-3
101	106	-5
138	115	23
118	170	-52
87	103	-16
116	145	-29
75	78	-3
96	107	-11
122	84	38
103	148	-45
116	147	-31
107	87	20
118	166	-48
103	146	-43

There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

1

So that we average out any effect due to doing the maze better the second time no matter which mask is used second.

See explanation for result.