Ex. 1a

Go to Page: 621 Go

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

Sarah Schrijvers

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Solution

The given question asks if you are satisfied with your vehicle. The possible answers are Yes and No.

Since the collected data is not numerical, we cannot compute means and thus this problem is about comparing proportions (and not comparing means).

Comparing proportions

0
Comments

Have a comment? Type it here ...

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LittleTurtle

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

Sarah Schrijvers

?

Solution

1

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Observational study

2

Thus we have an observational study that will compare the proportions of two samples originating from two independent populations.

Observational study

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

Sarah Schrijvers
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Solution

The subjects are asked if they have engaged in binge drinking. The possible answers are Yes and No.

Since the collected data is not numerical, we cannot compute means and thus this problem is about comparing proportions (and not comparing means).

Comparing proportions

0
Comments

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

Sarah Schrijvers

?

Solution

1

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Observational study

2

Thus we have an observational study that will compare the proportions of two samples originating from two independent populations.

Observational study

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

Sarah Schrijvers

Solution

The scores of the players are recorded and the scores are numerical values.

Since the collected data is numerical, we can compute means and thus this problem is about comparing means.

Comparing means

0
Comments

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LittleTurtle

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

Sarah Schrijvers

?

Solution

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Experiment

Experiment

0
Comments

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LittleTurtle

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Ex. 4a

Go to Page: 621 Go

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

The amount charged during the following six months is compared and thus the data is numerical.

Since the collected data is numerical, we can compute means and thus this problem is about comparing means.

Comparing means

0

Comments

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Submit

LittleTurtle

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

Sarah Schrijvers

?

Solution

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Experiment

Experiment

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

1

Given:

$$p_1 = 30\% = 0.30$$
$$p_2 = 15\% = 0.15$$
$$n_1 = 50$$
$$n_2 = 100$$

The sampling distribution of $p_1 - p_2$ is normal if n_1p_1, $n_1(1-p_1)$, n_2p_2 and $n_2(1-p_2)$ are greater than 10.

$$n_1p_1 = 50(0.30) = 15$$
$$n_1(1-p_1) = 50(1-0.30) = 35$$
$$n_2p_2 = 100(0.15) = 15$$
$$n_2(1-p_2) = 100(1-0.15) = 85$$

All are greater than 10, thus the sampling distribution of $p_1 - p_2$ is normal.

The mean of the sampling distribution of $p_1 - p_2$ is the difference between the proportions:

$$\mu = p_1 - p_2 = 0.30 - 0.15 = 0.15$$

The standard deviation of the sampling distribution of $p_1 - p_2$ is:

$$\sigma = \sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}} = \sqrt{\frac{0.30(1-0.30)}{50} + \frac{0.15(1-0.15)}{100}} \approx 0.0740$$

2

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

$$z = \frac{x-\mu}{\sigma} = \frac{0-0.15}{0.0740} \approx -2.03$$

Determine the corresponding probability using table A:

$$P(\hat{p}_1 < \hat{p}_2) = P(\hat{p}_1 - \hat{p}_2 < 0) = P(Z < -2.03) = 0.0212$$

$$P(\hat{p}_1 < \hat{p}_2) = 0.0212$$

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

Sarah Schrijvers

?

Solution

Result exercise 5a:

$$P(\hat{p}_1 < \hat{p}_2) = 0.0212 = 2.12\%$$

The probability of getting an equal proportion or more extreme is less than 2.12%.

Since the probability is less than 5%, the event is very unlikely to occur by chance and thus we have reason to doubt the company's claim.

Yes

0
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

?

Solution

1

Given:

$$p_1 = 80\% = 0.80$$
$$p_2 = 40\% = 0.40$$
$$n_1 = 60$$
$$n_2 = 75$$

The sampling distribution of $p_1 - p_2$ is normal if n_1p_1, $n_1(1-p_1)$, n_2p_2 and $n_2(1-p_2)$ are greater than 10.

$$n_1p_1 = 60(0.80) = 48$$
$$n_1(1-p_1) = 60(1-0.80) = 12$$
$$n_2p_2 = 75(0.40) = 30$$
$$n_2(1-p_2) = 75(1-0.40) = 45$$

All are greater than 10, thus the sampling distribution of $p_1 - p_2$ is normal.

The mean of the sampling distribution of $p_1 - p_2$ is the difference between the proportions:

$$\mu = p_1 - p_2 = 0.80 - 0.40 = 0.40$$

The standard deviation of the sampling distribution of $p_1 - p_2$ is:

$$\sigma = \sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}} = \sqrt{\frac{0.80(1-0.80)}{60} + \frac{0.40(1-0.40)}{75}} \approx 0.0766$$

2

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

$$z = \frac{x-\mu}{\sigma} = \frac{0.20-0.40}{0.0766} \approx -2.61$$

Determine the corresponding probability using table A:

$$P(\hat{p}_1 \geq \hat{p}_2 + 0.20) = P(\hat{p}_1 - \hat{p}_2 \geq 0.2) = P(Z \geq -2.61) = 1 - P(Z < -2.61) = 1 - 0.0045 = 0.9955$$

$$P(\hat{p}_1 \geq \hat{p}_2 + 0.20) = 0.9955$$

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

Sarah Schrijvers

?

Solution

Result exercise 5a:

$$P(\hat{p}_1 \geq \hat{p}_2 + 0.20) = 0.9955$$

Complement rule:

$$P(A \leq b) = 1 - P(A \geq b)$$

Then we obtain:

$$P(\hat{p}_1 \leq \hat{p}_2 + 0.20) = 1 - P(\hat{p}_1 \geq \hat{p}_2 + 0.20) = 1 - 0.9955 = 0.0045 = 0.45\%$$

The probability of getting an proportion difference equal to 0.20 or more extreme is 0.45%.

Since the probability is less than 5%, the event is very unlikely to occur by chance and thus we have reason to doubt the researcher's claim.

Yes

0
Comments

Have a comment? Type it here ...

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The Normal condition is not met because there were only 3 successes in the group from the west side of Woburn. Also, the Random condition is not met. This was not a random sample.

See explanation for result.

0

Comments

Sarah Schrijvers

3.0

Solution

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

Sarah Schrijvers

3.0

Solution

The Normal requirement requires that the number of failures in the number of successes in both samples are greater than 10.

We note that there are 6 successes in the first sample (people wearing wrist guards) and thus the Normal requirement is not satisfied.

Normal requirement has not been met.

0
Comments

Have a comment? Type it here ...

Submit

LittleTurtle

3.0

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

LittleTurtle

5.0

Solution

The Normal condition is not met. Three of the four counts of successes and failures are less than 10 (indeed, one is 0).

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

4.5

Solution

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

Sarah Schrijvers

5.0

Solution

The Normal requirement requires that the number of failures in the number of successes in both samples are greater than 10.

We note that there are 0 (none) successes in the first sample (microwave group) and thus the Normal requirement is not satisfied.

Normal requirement has not been met.

0
Comments

Have a comment? Type it here ...

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LittleTurtle

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

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 73$$
$$n_1 = 158$$
$$x_2 = 26$$
$$n_2 = 143$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{73}{158} \approx 0.462$$
$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{26}{143} \approx 0.182$$

For confidence level $1-\alpha = 0.90$, determine $z_{\alpha/2} = z_{0.05}$ using table II (look up 0.05 in the table, the z-score is then the found z-score with opposite sign):

$$z_{\alpha/2} = 1.645$$

The endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1-\hat{p}_2)-z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.462-0.182)-1.645\sqrt{\frac{0.462(1-0.462)}{158}+\frac{0.182(1-0.182)}{143}} \approx 0.1959$$

$$(\hat{p}_1-\hat{p}_2)+z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.462-0.182)+1.645\sqrt{\frac{0.462(1-0.462)}{158}+\frac{0.182(1-0.182)}{143}} \approx 0.3641$$

We are 90% confident that the proportion difference is between 0.1959 and 0.3641.

$$(0.1959, 0.3641)$$

0
Comments

Have a comment? Type it here ...

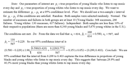
Submit

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

LittleTurtle

4.5

Solution



State: Our parameters of interest are p_1 = true proportion of young blacks who listen to rap music every day and p_2 = true proportion of young whites who listen to rap music every day. We want to estimate the difference $p_1 - p_2$ at a 95% confidence level. *Plan:* We should use a two-sample z interval for $p_1 - p_2$ if the conditions are satisfied. Random: Both samples were selected randomly. Normal: The number of successes and failures in both groups are at least 10 (Young blacks: 368 successes, 266 failures. Young whites: 130 successes, 437 failures). Independent: Both samples are less than 10% of their respective populations (there are more than 6,340 young blacks and 5,670 young whites in the U.S.).

The conditions are met. *Do:* From the data we find that $n_1 = 634$, $\hat{p}_1 = \frac{368}{634} = 0.580$, $n_2 = 567$, and $\hat{p}_2 = \frac{130}{567} = 0.229$. So our 95% confidence interval is

$(0.580 - 0.229) \pm 1.96\sqrt{\frac{0.580(0.420)}{634} + \frac{0.229(0.771)}{567}} = 0.351 \pm 0.052 = (0.299, 0.403)$. *Conclude:* We are 95% confident that the interval from 0.299 to 0.403 captures the true difference in proportions of young blacks and young whites who listen to rap music every day. This suggests that between 29.9% and 40.3% more young blacks than young whites listen to rap music every day.

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:

$$x_1 = 986$$
$$n_1 = 2253$$
$$x_2 = 923$$
$$n_2 = 2629$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{986}{2253} \approx 0.438$$
$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{923}{2629} \approx 0.351$$

For confidence level $1 - \alpha = 0.99$, determine $z_{\alpha/2} = z_{0.005}$ using table II (look up 0.005 in the table, the z-score is then the found z-score with opposite sign):

$$z_{\alpha/2} = 2.575$$

The endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1 - \hat{p}_2) - z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.438 - 0.351) - 2.575\sqrt{\frac{0.438(1-0.438)}{2253} + \frac{0.351(1-0.351)}{2629}} \approx 0.051$$

$$(\hat{p}_1 - \hat{p}_2) + z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.438 - 0.351) + 2.575\sqrt{\frac{0.438(1-0.438)}{2253} + \frac{0.351(1-0.351)}{2629}} \approx 0.123$$

We are 99% confident that the proportion difference is between 0.051and 0.123.

$$(0.051, 0.123)$$

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

Result exercise 13a:

$$(0.051, 0.123)$$

The confidence interval does not contain 0, it is very unlikely that the population proportions are equal and thus there is convincing evidence of a difference between the population proportions.

Yes

0
Comments

Have a comment? Type it here ...

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LittleTurtle

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

State: Our parameters of interest are p_1 = actual proportion of older black men who fear crime and p_2 = actual proportion of older black women who fear crime. We want to estimate the difference $p_1 - p_2$ at a 90% confidence level. *Plan:* We should use a two-sample z interval for $p_1 - p_2$ if the conditions are satisfied. Random: Both samples were selected randomly. Normal: The number of successes and failures in both groups are at least 10 (Older black men: 46 successes, 17 failures. Older black women: 27 successes, 29 failures). Independent: Both samples are less than 10% of their respective populations (there are more than 630 older black men and 560 older black women in Atlantic City, NJ). The conditions are met. *Do:* From the data we find that $n_1 = 63$, $\hat{p}_1 = \frac{46}{63} = 0.730$, $n_2 = 56$, and $\hat{p}_2 = \frac{27}{56} = 0.482$. So our 90% confidence interval is

$$(0.730 - 0.482) \pm 1.645\sqrt{\frac{0.730(0.270)}{63} + \frac{0.482(0.519)}{56}} = 0.248 \pm 0.143 = (0.105, 0.391).$$

Conclude: We are 90% confident that the interval between 0.105 and 0.391 captures the true difference in the proportions of older black men and older black women who fear crime. This interval suggests that between 10.5% and 39.1% more older black men than older black women fear crime.

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

Since the
interval does not contain 0, there is convincing evidence that the two proportions are not the same.

See explanation for result. ...

0
Comments

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Sarah Schrijvers
?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$\hat{p}_1 = 79\% = 0.79$$
$$n_1 = 800$$
$$\hat{p}_2 = 67\% = 0.67$$
$$n_2 = 400$$

The null hypothesis states that the population proportions are equal or that there difference is zero:

$$H_0 : p_1 - p_2 = 0$$

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

$$H_a : p_1 - p_2 \neq 0$$

p_1 is the population proportion of teens that own an iPod or MP3 player.
p_2 is the population proportion of young adults that own an iPod or MP3 player.

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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:

$$x_1 = 34$$
$$n_1 = 1679$$
$$x_1 = 24$$
$$n_2 = 1366$$

The null hypothesis states that the population proportions are equal or that there difference is zero:

$$H_0 : p_1 - p_2 = 0$$

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

$$H_a : p_1 - p_2 \neq 0$$

p_1 is the population proportion of freshman that used anabolic steroids.
p_2 is the population proportion of seniors that used anabolic steroids.

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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 5.0

Solution

Given:

$$\hat{p}_1 = 79\% = 0.79$$
$$n_1 = 800$$
$$\hat{p}_2 = 67\% = 0.67$$
$$n_2 = 400$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{632}{800} = 0.79$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{268}{400} = 0.67$$

$$\hat{p}_p = \frac{x_1 + x_2}{n_1 + n_2} = \frac{632 + 268}{800 + 400} = \frac{900}{1200} = 0.75$$

Determine the value of the test statistic:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1-\hat{p}_p)}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{0.79 - 0.67}{\sqrt{0.75(1-0.75)}\sqrt{\frac{1}{800} + \frac{1}{400}}} \approx 4.53$$

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:

$$P = P(Z < -4.53 \text{ or } Z > 4.53) = 2 \times P(Z < -4.53) = 2 \times 0.0001 = 0.0002$$

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

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

There is sufficient evidence to support the claim of a difference between the population proportions.

There is sufficient evidence to support the claim of a difference between the population proportions.

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

5.0

Solution

Given:

$$\hat{p}_1 = 79\% = 0.79$$
$$n_1 = 800$$
$$\hat{p}_2 = 67\% = 0.67$$
$$n_2 = 400$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{632}{800} = 0.79$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{268}{400} = 0.67$$

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 endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1-\hat{p}_2)-z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.79-0.67)-1.96\sqrt{\frac{0.79(1-0.79)}{800}+\frac{0.67(1-0.67)}{400}} \approx 0.066$$

$$(\hat{p}_1-\hat{p}_2)+z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.79-0.67)+1.96\sqrt{\frac{0.79(1-0.79)}{800}+\frac{0.67(1-0.67)}{400}} \approx 0.174$$

We are 95% confident that the proportion difference is between 0.066 and 0.174.

The confidence interval does not contain 0 and thus the confidence is consistent with the result of part (a) that there is a difference.

$$(0.066, 0.174)$$

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:

$$x_1 = 34$$
$$n_1 = 1679$$
$$x_1 = 24$$
$$n_2 = 1366$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{34}{1679} \approx 0.0203$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{24}{1366} \approx 0.0176$$

$$\hat{p}_p = \frac{x_1 + x_2}{n_1 + n_2} = \frac{34 + 24}{1679 + 1366} = \frac{58}{3045} \approx 0.0190$$

Determine the value of the test statistic:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1 - \hat{p}_p)}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{0.0203 - 0.0176}{\sqrt{0.0190(1 - 0.0190)}\sqrt{\frac{1}{1679} + \frac{1}{1366}}} \approx 0.54$$

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:

$$P = P(Z < -0.54 \text{ or } Z > 0.54) = 2 \times P(Z < -0.54) = 2 \times 0.2946 = 0.5892$$

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

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

There is not sufficient evidence to support the claim of a difference between the population proportions.

There is not sufficient evidence to support the claim of a difference between the population proportions.

Ex. 18b

Go to Page: 623 Go

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 difference $p_1 - p_2$ at a 95% confidence level.
Plan: We should use a two-sample z interval for $p_1 - p_2$ if the conditions are satisfied. We checked the conditions in (a) and they have been met. *Do:* From the data we find that
$n_1 = 1679$, $\hat{p}_1 = 0.0203$, $n_2 = 1366$, and $\hat{p}_2 = 0.0176$. So our 95% confidence interval is

$$(0.203 - 0.0176) \pm 1.96\sqrt{\frac{0.0203(0.9797)}{1679} + \frac{0.0176(0.9824)}{1366}} = 0.0027 \pm 0.0097 = (-0.007, 0.0124).$$

Conclude: We are 95% confident that the interval from -0.007 to 0.0124 captures the true difference in the proportions of freshmen and seniors who use anabolic steroids. This is consistent with our answer to part (a). In both cases we decided that 0 was a plausible value for the difference in the proportions.

See explanation for result.

1 Comment ▲

mv4641 1 yr

In the equation the number should be 0.0203 not 0.203
The answer is still correct

Have a comment? Type it here ...

Submit

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

LittleTurtle

3.0

Solution

Here are the issues that are wrong: (1) Holly fails to identify that p_1 is the actual proportion of black men who would marry a person from a lower social class than their own and p_2 is the actual proportion of black women who would marry a person from a lower social class than their own. (2) Holly says that she will do a one-sample z test when it should be a two-sample z test. (3) Holly checks all the correct conditions, but what she calls her check of the Normal condition is really her check of the Independence condition and vice versa. She also fails to check the 10% condition as part of the Independence condition check. (4) In the Do stage, Holly miscalculates the value of $\hat{p}_2$. It should be $\hat{p}_2 = \frac{117}{236} = 0.50$. (5) Holly forgets to compute the pooled proportion as $\hat{p}_C = \frac{91+117}{149+236} = \frac{208}{385} = 0.54$. (6) Holly uses the wrong formula for the test statistic because she didn't compute the pooled proportion. The correct statistic is: $z = \frac{(0.61-0.50)-0}{\sqrt{\frac{(0.54)(0.46)}{149}+\frac{(0.54)(0.46)}{236}}} = 2.11$. (7) Holly computes the P-value based on a one-sided test instead of a two-sided test. It should be $2P(z > 2.11) = 2(0.0174) = 0.0348$. (8) Finally she should have a two-sided conclusion rather than a one-sided conclusion. And Holly shouldn't have used the word "prove."

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

Here are the issues that are wrong: (1) Min Jae stated in the conditions check that the data came from two random samples. In fact, it came from a randomized experiment. Also, the Independent condition is checked incorrectly. There was no sampling done here. (2) He computed his sample proportions incorrectly. They should be: $\hat{p}_1 = \frac{30}{50} = 0.60$ and $\hat{p}_2 = \frac{22}{50} = 0.44$. (3) He also incorrectly calculated the test statistic. It should be $z = \frac{(0.60 - 0.44) - 0}{\sqrt{\frac{(0.52)(0.48)}{50} + \frac{(0.52)(0.48)}{50}}} = 1.60$. (4) The new P-value is $P(z > 1.60) = 0.0548$. Despite the new P-value, his conclusion is still good.

See explanation for result.

0

Comments

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Sarah Schrijvers

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

(a) Given:

$$x_1 = 3396$$
$$n_1 = 19541$$
$$x_2 = 4929$$
$$n_2 = 29294$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{3396}{19541} \approx 0.174$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{4929}{29294} \approx 0.168$$

$$\hat{p}_p = \frac{x_1 + x_2}{n_1 + n_2} = \frac{3396 + 4929}{19541 + 29294} \approx 0.170$$

Determine the value of the test statistic:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1-\hat{p}_p)}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{0.174 - 0.168}{\sqrt{0.168(1-0.168)}\sqrt{\frac{1}{19541} + \frac{1}{29294}}} \approx 1.74$$

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:

$$P = P(Z < -1.74 \text{ or } Z > 1.74) = 2 \times P(Z < -1.74) = 2 \times 0.0409 = 0.0818$$

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

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

There is not sufficient evidence to support the claim of a difference.

2

(b) Type I error: Reject the null hypothesis H_0, when H_0 is true.

Consequence: There is no significant difference in both groups, while it appears that there is a significant difference. Thus the design is random, while it appears no random.

Type II error: Failing to reject the null hypothesis H_0, when H_0 is false.

Consequence: There is a significant difference in both groups, while it

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 $H_0: p_1 - p_2 = 0$ versus $H_a: p_1 - p_2 \neq 0$ where p_1 is the actual proportion of patients like the ones in the study who would have a stroke when taking aspirin alone and p_2 is the actual proportion of patients like the ones in the study who would have had a stroke when taking both drugs. *Plan:* We should use a two-sample z test for $p_1 - p_2$ if the conditions are satisfied. Random: This was a randomized comparative experiment. Normal: The number of successes and failures in both groups are at least 10 (Aspirin alone: 206 successes, 1443 failures. Additional medicine group: 157 successes, 1493 failures). Independent: Due to the random assignment, these two groups of patients can be viewed as independent. Individual observations in each group should also be independent: knowing whether one patient had a stroke or not gives no information about another patient. The conditions are met. *Do:* The proportions of stroke victims in each group are $\hat{p}_1 = \frac{206}{1649} = 0.125$ and $\hat{p}_2 = \frac{157}{1650} = 0.095$. The pooled proportion is $\hat{p}_C = \frac{206+157}{1649+1650} = \frac{363}{3299} = 0.11$.

The test statistic is $z = \frac{(0.125-0.095)-0}{\sqrt{\frac{(0.11)(0.89)}{1649} + \frac{(0.11)(0.89)}{1650}}} = 2.75$. Since this is a two-sided test the P-value is $2P(z > 2.75) = 2(0.0030) = 0.006$. *Conclude:* Since the P-value is less than 0.05, we reject the null hypothesis. We have enough evidence to conclude that there is a difference in the proportions of patients like the ones in this study who suffer strokes depending on whether they take aspirin alone or take the additional medication as well.

See explanation for result.

0
Comments

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Submit

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

LittleTurtle
3.5

Solution

A Type I error would be to conclude that there is a difference between the stroke rates for the two treatments when there is no difference and a Type II error would be to conclude that there is no difference between the stroke rates of people on the two different treatments when there actually is. A Type II error would be more serious in this case because we would not market a drug that would reduce the number of strokes that people suffer.

See explanation for result.

0
Comments

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Sarah Schrijvers
?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

1

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$

We note that we want to execute a test about comparing two populations mean, this is done by using the two-sample z test.

2

Conditions: Random, Normal and Independent

Random: Satisfied, because the study is a randomized experiment.

Normal: Satisfied, because the number of success (44, 21) and failures ($88 - 44 = 44, 81 - 21 = 60$) is greater than 10 for each sample.

Independent: Can be assumed, because the women were randomly assigned to a group.

Thus all conditions have been met.

Two-sample z test

0
Comments

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Submit

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

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$
$$P = 0.0007 = 0.07\%$$

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.

The probability of obtaining a difference between the proportions as in this sample or more extreme is 0.07%, if the population proportions are equal.

The probability of obtaining a difference between the proportions as in this sample or more extreme is 0.07%, if the population proportions are equal.

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

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$
$$P = 0.0007 \text{ (from exercise 23b)}$$

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

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

There is sufficient evidence that the pregnancy rate is higher for women who received intercessory prayer.

There is sufficient evidence that the pregnancy rate is higher for women who received intercessory prayer.

0
Comments

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Ex. 23d

Go to Page: 625 Go

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

Sarah Schrijvers

?

Solution

If the women were aware that they were being prayed for, they might unconsciously change their behavior, which could change the chance of a pregnancy.

See explanation

0
Comments

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LittleTurtle

?

Solution

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

Sarah Schrijvers

?

Solution

1

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$

We note that we want to execute a test about comparing two populations mean, this is done by using the two-sample z test.

2

Conditions: Random, Normal and Independent

Random: Satisfied, because the study is a randomized experiment.

Normal: Satisfied, because the number of success (34, 21) and failures ($80 - 34 = 46, 80 - 21 = 59$) is greater than 10 for each sample.

Independent: Can be assumed, because the women were randomly assigned to a group.

Thus all conditions have been met.

Two-sample z test

0
Comments

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

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$
$$P = 0.0152 = 1.52\%$$

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.

The probability of obtaining a difference between the proportions as in this sample or more extreme is 1.52%, if the population proportions are equal.

The probability of obtaining a difference between the proportions as in this sample or more extreme is 1.52%, if the population proportions are equal.

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$H_0 : p_1 = p_2$$
$$H_a : p_1 > p_2$$
$$P = 0.0152 \text{ (from exercise 24b)}$$

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

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

There is sufficient evidence that the pregnancy rate is higher for women who received acupuncture.

There is sufficient evidence that the pregnancy rate is higher for women who received acupuncture.

0
Comments

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Submit

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

Sarah Schrijvers

?

Solution

The individuals who received acupuncture, were aware that they were acupuncture, while they should not have been aware if they got the acupuncture or the "placebo". Thus these individuals might be influenced by the so called placebo effect, which the study did not take into account.

This problem could be solved by including a group who receive "fake" acupuncture.

See explanation

0
Comments

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LittleTurtle

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 44$$
$$n_1 = 88$$
$$x_2 = 21$$
$$n_2 = 81$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{44}{88} = 0.5$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{21}{81} \approx 0.259$$

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 endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1-\hat{p}_2)-z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.5-0.259)-1.96\sqrt{\frac{0.5(1-0.5)}{88}+\frac{0.259(1-0.259)}{81}} \approx 0.100$$

$$(\hat{p}_1-\hat{p}_2)+z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.5-0.259)+1.96\sqrt{\frac{0.5(1-0.5)}{88}+\frac{0.259(1-0.259)}{81}} \approx 0.382$$

We are 95% confident that the proportion difference is between 0.100 and 0.382.

$$(0.100, 0.382)$$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 34$$
$$n_1 = 80$$
$$x_2 = 21$$
$$n_2 = 80$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{34}{80} = 0.425$$
$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{21}{80} = 0.2625$$

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 endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1-\hat{p}_2)-z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.425-0.2625)-1.96\sqrt{\frac{0.425(1-0.425)}{80}+\frac{0.2625(1-0.2625)}{80}} \approx 0.0175$$

$$(\hat{p}_1-\hat{p}_2)+z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.425-0.2625)+1.96\sqrt{\frac{0.425(1-0.425)}{80}+\frac{0.2625(1-0.2625)}{80}} \approx 0.3075$$

We are 95% confident that the proportion difference is between 0.0175 and 0.3075.

$[0.0175, 0.3075]$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 10$$
$$n_1 = 50$$
$$x_2 = 28$$
$$n_2 = 53$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{10}{50} = 0.2$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{28}{53} \approx 0.528$$

$$\hat{p}_p = \frac{x_1 + x_2}{n_1 + n_2} = \frac{10 + 28}{50 + 53} = \frac{38}{103} \approx 0.369$$

Determine the value of the test statistic:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1 - \hat{p}_p)}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{0.2 - 0.528}{\sqrt{0.369(1 - 0.369)}\sqrt{\frac{1}{50} + \frac{1}{53}}} \approx -3.45$$

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:

$$P = P(Z < -3.45 \text{ or } Z > 3.45) = 2 \times P(Z < -3.45) = 2 \times 0.0003 = 0.0006$$

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

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

There is sufficient evidence to reject the claim that the two age groups are equally skilled.

No

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

Sarah Schrijvers

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Solution

This is important for the data of each car to be independent of the other cars.

If a car slows down, because other cars slow down, then this car is not independent of the other cars that slowed down too.

Independent

0
Comments

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LittleTurtle

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 5690$$
$$n_1 = 12931$$
$$x_2 = 1051$$
$$n_2 = 3285$$

Determine the hypotheses:

$$H_0 : p_1 - p_2 = 0$$
$$H_a : p_1 - p_2 \neq 0$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{5690}{12931} \approx 0.440$$

$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{1051}{3285} \approx 0.320$$

$$\hat{p}_p = \frac{x_1 + x_2}{n_1 + n_2} = \frac{5690 + 1051}{12931 + 3285} = \frac{6741}{16216} \approx 0.416$$

Determine the value of the test statistic:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1 - \hat{p}_p)}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{0.440 - 0.320}{\sqrt{0.416(1 - 0.416)}\sqrt{\frac{1}{12931} + \frac{1}{3285}}} \approx 12.46$$

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:

$$P = P(Z < -12.46 \text{ or } Z > 12.46) = 2 \times P(Z < -12.46) = 2 \times 0.0001 = 0.0002$$

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

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

There is sufficient evidence to support the claim that there is a difference.

Yes

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The null hypothesis always includes the equal sign =:

$$H_0 : p_M - p_F = 0$$

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

$$H_a : p_M - p_F > 0$$

because if $p_M - p_F > 0$, then $p_M > p_F$.

$\boxed{\text{(b) } H_0 : p_M - p_F = 0,\ H_a : p_M - p_F > 0}$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 410$$
$$n_1 = 500$$
$$x_1 = 484$$
$$n_2 = 550$$

The pooled sample proportion is then:

$$\hat{p}_C = \frac{x_1 + x_2}{n_1 + n_2} = \frac{410 + 484}{500 + 550} = \frac{894}{1050} \approx 0.85$$

$$\text{(d) } \hat{p}_C \approx 0.851$$

0
Comments

Have a comment? Type it here ...

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given:

$$x_1 = 484$$
$$n_1 = 550$$
$$x_2 = 410$$
$$n_2 = 500$$

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

$$\hat{p}_1 = \frac{x_1}{n_1} = \frac{484}{550} = 0.88$$
$$\hat{p}_2 = \frac{x_2}{n_2} = \frac{410}{500} = 0.82$$

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 endpoints of the confidence interval for $p_1 - p_2$ are then:

$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (0.88 - 0.82) \pm 1.96\sqrt{\frac{0.88(1-0.88)}{550} + \frac{0.82(1-0.82)}{500}} \approx 0.06 \pm 0.043$$

(b) 0.06 ± 0.043

0
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There are 2 solutions for this exercise.
Please see your textbook for the exercise prompt.

Sarah Schrijvers

Solution

The Normal requirement requires that the number of failures in the number of successes in both samples are greater than 10.

We note that there are 7 successes in the first sample and 2 successes in the second sample, thus the Normal requirement is not satisfied.

(e) should not be used because the Normal condition is violated.

LittleTurtle

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

Sarah Schrijvers

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Solution

General equation of the least-squares regression line:

$$\hat{y} = a + bx$$

with $\hat{y}$ the predicted mileage and x the age.

The constant a is given in the row with "Constant" and in the column with "Coef":

$$a = -13832$$

The slope b is given in the row with "Age" and in the column with "Coef":

$$b = 14954$$

The least-squares equation then becomes:

$$\hat{y} = -13832 + 14954x$$

with $\hat{y}$ the predicted mileage and x the age.

$$\hat{y} = -13832 + 14954x$$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Result exercise 33a:

$$\hat{y} = -13832 + 14954x$$

with $\hat{y}$ the predicted mileage and x the age.

The slope is the coefficient of x:

$$SLOPE = 14954$$

This means that the mileage increases on average by about 14954 miles per year.

The mileage increases on average by about 14954 miles per year.

0
Comments

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LittleTurtle

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 33a:

$$\hat{y} = -13832 + 14954x$$

with $\hat{y}$ the predicted mileage and x the age.

Replace x with 10:

$$\hat{y} = -13832 + 14954(10) = 135708 \text{ miles}$$

The residual is the difference between the actual value and the predicted value:

$$RESIDUAL = y - \hat{y} = 110000 - 135708 = -25708 \text{ miles}$$

$$\boxed{RESIDUAL = -25708 \text{ miles}}$$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The value of r^2 is given in the output as "R-Sq":

$$r = 77.0\% = 0.770$$

This tells us that 77.0% of the variation between the variables has been explained by the least-squares regression line.

77.0% of the variation between the variables has been explained by the least-squares regression line.

0
Comments

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LittleTurtle

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

3.0

Solution

Result exercise 33a:

$$\hat{y} = -13832 + 14954x$$

with $\hat{y}$ the predicted mileage and x the age.

The point $(\overline{x}, \overline{y})$ lies on the least-squares regression line and thus the mean mileage is the image of $\overline{x}$:

$$\overline{y} = -13832 + 14954\overline{x} = -13832 + 14954(8) = 105,800$$

Thus the mean mileage is 105,800 miles.

105,800 miles

0
Comments

Have a comment? Type it here ...

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LittleTurtle

1.0

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

Sarah Schrijvers
5.0

Solution

The value of s given in the output:

$$s = 22723$$

This means that the error made when predicting the mileage using the least-squares regression line is on average 22723 miles.

The error made when predicting the mileage using the least-squares regression line is on average 22723 miles.

LittleTurtle
1.0

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

Sarah Schrijvers

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Solution

No, the least-squares line was determined using data of students. The data of students is not representative for the teachers and thus we cannot use the least-squares line to predict the mileage of cars of teachers.

No

0
Comments

Have a comment? Type it here ...

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LittleTurtle

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

3.0

Solution

The distribution of $M - B$ is Normal with mean $\mu_{M-B} = \mu_M - \mu_B = 188 - 170 = 18$ mg/dl and standard deviation $\sigma_{M-B} = \sqrt{\sigma_M^2 + \sigma_B^2} = \sqrt{(41)^2 + (30)^2} = 50.80$ mg/dl.

See explanation for result.

0
Comments

Have a comment? Type it here ...

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Sarah Schrijvers

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

1.0

Solution

$$P(M-B<0)=P\left(z<\frac{0-18}{50.80}\right)=P(z<-0.35)=0.3632.$$

See explanation for result.

0
Comments

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Sarah Schrijvers

?

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

LittleTurtle

5.0

Solution

The distribution of $M-W$ is Normal with mean $\mu_{M-W}=\mu_M-\mu_W=69.3-64.5=4.8$ inches
and standard deviation $\sigma_{M-W}=\sqrt{\sigma_M^2+\sigma_W^2}=\sqrt{(2.8)^2+(2.5)^2}=3.75$ inches.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

whylearnwhenucanswag

?

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

Sarah Schrijvers

?

Solution

Result exercise 36a: $M - B$ is normally distributed with $\mu_{M-W} = 4.8$ and $\sigma_{M-W} \approx 3.7537$

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

$$z = \frac{x - \mu}{\sigma} = \frac{2 - 4.8}{3.7537} = -0.75$$

Determine the probability using table A:

$$P(M - W > 2) = P(Z > -0.75) = P(Z < 0.75) = 0.7734$$

$$P(M - W > 2) = 0.7734$$

0
Comments

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LittleTurtle

?

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

Sarah Schrijvers

?

Solution

Given:

Distribution M: Normal with $\mu_M = 188$ and $\sigma_M = 41$
Distribution B: Normal with $\mu_B = 170$ and $\sigma_B = 30$

$$n_M = 25$$
$$n_B = 36$$

The sample mean $\overline{x}$ is normally distributed with mean μ and standard deviation $\sigma/\sqrt{n}$ (if the population distribution is normal with mean μ and standard deviation σ).

If $\overline{x}_M$ and $\overline{x}_B$ are normally distributed, then there difference $\overline{x}_M - \overline{x}_B$ is also normally distributed.

Properties mean and standard deviation:

$$\mu_{aX+bY} = a\mu_X + b\mu_Y$$
$$\sigma_{aX+bY} = \sqrt{a^2\sigma_X^2 + b^2\sigma_Y^2}$$

Then we obtain:

$$\mu_{\overline{x}_M - \overline{x}_B} = \mu_{\overline{x}_M} - \mu_{\overline{x}_B} = 188 - 170 = 18$$
$$\sigma_{\overline{x}_M - \overline{x}_B} = \sqrt{\sigma_{\overline{x}_M}^2 + \sigma_{\overline{x}_B}^2} = \sqrt{\frac{41^2}{25} + \frac{30^2}{36}} \approx 9.6042$$

Thus the distribution of $\overline{x}_M - \overline{x}_B$ is normal with mean $\mu_{\overline{x}_M - \overline{x}_B} = 18$ and standard deviation $\sigma_{\overline{x}_M - \overline{x}_B} \approx 9.6042$

Normal with $\mu_{\overline{x}_M - \overline{x}_B} = 18$ and $\sigma_{\overline{x}_M - \overline{x}_B} \approx 9.6042$

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 37a: $\overline{x}_M - \overline{x}_B$ is normal distributed with $\mu_{\overline{x}_M - \overline{x}_B} = 18$ and $\sigma_{\overline{x}_M - \overline{x}_B} \approx 9.6042$

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

$$z = \frac{x - \mu}{\sigma} = \frac{0 - 18}{9.6042} = -1.87$$

Determine the probability using table A:

$$P(\overline{x}_M - \overline{x}_B < 0) = P(Z < -1.87) = 0.0307$$

$$P(\overline{x}_M - \overline{x}_B < 0) = 0.0307$$

0
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

Result exercise 37b:

$$P(\overline{x}_M - \overline{x}_B < 0) = 0.0307 = 3.07\%$$

Since the probability is less than 5%, it is unlikely that the sample mean for boys exceeds the sample mean for men and thus we should be surprised.

Yes

0
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.

LittleTurtle

5.0

Solution

The distribution of $\bar{x}_M - \bar{x}_W$ is Normal with mean
$\mu_{\bar{x}_M - \bar{x}_W} = \mu_M - \mu_W = 69.3 - 64.5 = 4.8$ inches and standard deviation
$\sigma_{\bar{x}_M - \bar{x}_W} = \sqrt{\frac{\sigma_M^2}{n_M} + \frac{\sigma_W^2}{n_W}} = \sqrt{\frac{(2.8)^2}{16} + \frac{(2.5)^2}{9}} = 1.09$ inches.

See explanation for result.

0
Comments

Sarah Schrijvers

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

LittleTurtle 5.0

Solution

$$P(\bar{Y}_M - \bar{Y}_W \geq 2) = P\left(z \geq \frac{2-4.8}{1.09}\right) = P(z \geq -2.57) = 0.9949.$$

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers ?

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

LittleTurtle

5.0

Solution

No. It is almost certain (a 99.49%
chance) that the sample mean height for young women is more than 2 inches less than the sample mean height for the young men.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

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

Sarah Schrijvers

?

Solution

Requirements for two-sample t procedures: Random, Normal and Independent.

The Normal requirement is not satisfied, because the distribution for "Males" is skewed and the corresponding sample size is less than 30 .

Normal requirement not met.

0
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

?

Solution

Requirements for two-sample t procedures: Random, Normal and Independent.

Random: Satisfied, because the data was selected using the random data selector.

Normal: Satisfied, because the sample size of both samples (50) is at least 30.

Independent: Satisfied, because given is that the samples are independent and the sample size is less than 10% of the population size.

Thus all requirements have been satisfied.

Conditions have been met.

0
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

?

Solution

Requirements for two-sample t procedures: Random, Normal and Independent.

The Independent requirement is not satisfied, because the data is of all Islamic nations with populations of more than 3 million (except fir Afghanistan and Iraq) and thus we have data of more than 10% of all Islamic nations.

Since the sample size is less than 10% of the population size, the independent requirement is not satisfied.

Independent requirement not met.

0
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

?

Solution

Requirements for two-sample t procedures: Random, Normal and Independent.

The Random requirement is not satisfied, because the samples of words were conveniently chosen as the first 200 words, which is not representative for all words.

Random requirement not met.

LittleTurtle

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

The centers of the two groups seem to be quite different with people drinking red wine generally having more polyphenol in their blood . The spreads, however, are approximately the same.

See explanation for result.

0

Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

?

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:

$$\overline{x}_1 = 5.5$$

$$\overline{x}_2 = 0.2333$$

n is the number of values in the data set.

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

$$s_1 = 2.5169$$

$$s_2 = 3.2920$$

2

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(9-1, 9-1) = 8$$

Determine t^* with $df = 8$ and $c = 90\%$ using table B:

$$t^* = 1.860$$

The endpoints of the confidence interval for $\mu_1 - \mu_2$ are:

$$(\overline{x}_1 - \overline{x}_2) - t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (5.5 - 0.2333) - 1.860 \cdot \sqrt{\frac{2.5169^2}{9} + \frac{3.2920^2}{9}} \approx 2.6975$$

$$(\overline{x}_1 - \overline{x}_2) + t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (5.5 - 0.2333) + 1.860 \cdot \sqrt{\frac{2.5169^2}{9} + \frac{3.2920^2}{9}} \approx 7.8539$$

We are 90% confident that the mean difference is between 2.6975 and 7.8539.

$$(2.6975, 7.8539)$$

0

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

LittleTurtle

3.0

Solution

Since this interval does not contain 0, ikt does support the researcher's belief that the polyphenol level is different for men who drink red wine than for those who drink white wine.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

?

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

LittleTurtle

5.0

Solution

The centers of the two groups seem to be quite different, with red flowers being longer. The red flowers also seem to have more variability to their lengths.

See explanation for result.

0
Comments

Have a comment? Type it here ...

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Sarah Schrijvers

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

State: Our parameters of interest are μ_1 = the actual mean length of red flowers and μ_2 = the actual mean length of yellow flowers. We want to estimate the difference $\mu_1 - \mu_2$ at a 95% confidence level. *Plan:* We should use a two-sample t interval for $\mu_1 - \mu_2$ if the conditions are satisfied. Random: Both samples were randomly selected. Normal: Both sample sizes were less than 30. However, the dotplots given in the problem do not indicate serious skewness or large outliers. Independent: Both samples are less than 10% of their respective populations (there are more than 230 red flowers and 150 yellow flowers). The conditions are met. *Do:* From the data we find that $n_1 = 23$, $\bar{x}_1 = 39.698$, $s_1 = 1.786$, $n_2 = 15$, $\bar{x}_2 = 36.18$, and $s_2 = 0.975$. We will use the conservative degrees of freedom which is 14 in this case. So our 95% confidence interval is $(39.698 - 36.18) \pm 2.145\sqrt{\frac{(1.786)^2}{23} + \frac{(0.975)^2}{15}} = 3.518 \pm 0.964 = (2.554, 4.482)$.

Conclude: We are 95% confident that the interval from 2.554 to 4.482 captures the difference in actual mean length of red flowers and yellow flowers. This suggests that the mean length of red flowers is between 2.554 mm and 4.482 mm larger than the mean length of the yellow flowers.

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

Since 0 is not in
this interval, it does support the researchers' belief that the two varieties have different lengths.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers ?

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

LittleTurtle
5.0

Solution

The distributions are skewed to the right because the earnings amounts cannot be negative, yet the standard deviation is almost as large as the distance between the mean and 0. The use of the two-sample t procedures is still justified because the t procedures are robust against non-Normality in the populations with such large sample sizes.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers
?

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

LittleTurtle

5.0

Solution

State: Our parameters of interest are μ_1 = the actual mean summer earnings of male students and μ_2 = the actual mean summer earnings of female students. We want to estimate the difference $\mu_1 - \mu_2$ at a 90% confidence level. *Plan:* We should use a two-sample t interval for $\mu_1 - \mu_2$ if the conditions are satisfied. Random: Both samples were randomly selected. Normal: Both sample sizes were at least 30. Independent: Both samples are less than 10% of their respective populations (since this was a large university, there are likely more than 6750 males with summer jobs and 6210 females with summer jobs). The conditions are met. *Do:* From the data we find that $n_1 = 675$, $\bar{x}_1 = 1884.52$, $s_1 = 1368.37$, $n_2 = 621$, $\bar{x}_2 = 1360.39$, and $s_2 = 1037.46$. We will use the conservative degrees of freedom which is 620 in this case. So our 90% confidence interval is

$$(1884.52 - 1360.39) \pm 1.647\sqrt{\frac{(1368.37)^2}{675} + \frac{(1037.46)^2}{621}} = 524.13 \pm 110.572 = (413.558, 634.702).$$

Conclude: We are 90% confident that the interval from 413.558 to 634.702 captures the actual difference in mean summer earnings of male students and female students. This suggests that male students have mean summer earnings between \$413.56 and \$634.70 higher than female students.

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 90% confidence interval means that on average 90% of all possible samples will have a confidence interval that contains the true population mean difference of earnings.

The 90% confidence interval means that on average 90% of all possible samples will have a confidence interval that contains the true population mean difference of earnings.

0

Comments

Have a comment? Type it here ...

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LittleTurtle

?

Solution

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

LittleTurtle

5.0

Solution

The use of the two-sample t procedure is still justified because the t procedures are robust against non-Normality in the populations with such large samples.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

LittleTurtle

5.0

Solution

State: Our parameters of interest are μ_1 = the actual mean reliability rating of Anglo customers and μ_2 = the actual mean reliability rating of Hispanic customers. We want to estimate the difference $\mu_1 - \mu_2$ at a 95% confidence level. *Plan:* We should use a two-sample t interval for $\mu_1 - \mu_2$ if the conditions are satisfied. Random: Both samples were randomly selected. Normal: Both sample sizes were at least 30. Independent: Both samples are less than 10% of their respective populations (there are likely more than 920 Anglo customers of the bank and 860 Hispanic customers of the bank). The conditions are met. *Do:* From the data we find that $n_1 = 92$, $\bar{x}_1 = 6.37$, $s_1 = 0.60$, $n_2 = 86$, $\bar{x}_2 = 5.91$, and $s_2 = 0.93$. We will use the conservative degrees of freedom which is 85 in this case. So our 95% confidence interval is

$$(6.37 - 5.91) \pm 1.988\sqrt{\frac{(0.60)^2}{92} + \frac{(0.93)^2}{86}} = 0.46 \pm 0.235 = (0.225, 0.695).$$

Conclude: We are 95% confident that the interval from 0.225 to 0.695 captures the actual difference in mean reliability rating for Anglos and Hispanics. This suggests that the mean reliability rating for Anglos is between 0.225 and 0.695 higher than the mean reliability rating for Hispanics.

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

If we repeatedly took random samples of 92 Anglos and 86 Hispanics and each time constructed a 95% confidence interval in this same way, about 95% of the resulting intervals would capture the actual difference in mean reliability rating.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers

1.0

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

Sarah Schrijvers

?

Solution

Give each day of the 60 days a unique number between 1 and 60.

Select the first 2-digit number.

If the number if between 01 and 60, then select the corresponding day for design A, else ignore the number and move on to the next 2-digit number.

Repeat the process until 30 days have been selected for design A and repeated numbers are ignored.

The remaining 30 days are assigned to design A.

Determine the first 3 days for design A:

$$24 \Rightarrow \text{Select day } 24$$
$$00 \Rightarrow \text{Ignore}$$
$$55 \Rightarrow \text{Select day } 55$$
$$21 \Rightarrow \text{Select day } 21$$

Thus day 21, 24 and 55 were selected for design A.

Day 21, 24 and 55 were selected for design A.

0

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

We want to test if there is a difference and then it is best to use a two-sided significance test.

The null hypothesis states that the population means are equal:

$$H_0 : \mu_1 = \mu_2$$

The alternative hypothesis states the opposite of the null hypothesis and uses the $\neq$ symbol because we use the two-sided significance test.

$$H_a : \mu_1 \neq \mu_2$$

Two-sided

$H_0 : \mu_1 = \mu_2$

$H_a : \mu_1 \neq \mu_2$

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:

$$n_1 = 30$$
$$n_2 = 30$$

The degrees of freedom is the minimum sample size decrease by 1:

$$df = \min(n_1 - 1, n_2 - 1) = \min(30 - 1, 30 - 1) = 29$$

$$df = 29$$

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

Given:

$$n_1 = 30$$
$$n_2 = 30$$
$$t = 2.06$$
$$H_0 : \mu_1 = \mu_2 \text{ (result exercise 47b)}$$
$$H_a : \mu_1 \neq \mu_2 \text{ (result exercise 47b)}$$

The degrees of freedom is the minimum sample size decrease by 1:

$$df = \min(n_1 - 1, n_2 - 1) = \min(30 - 1, 30 - 1) = 29$$

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 $df = 29$:

$$0.04 = 2 \times 0.02 < P < 2 \times 0.025 = 0.05$$

If the P-value is less than or equal to 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 that there is a difference.

$0.04 < P < 0.05$

There is sufficient evidence to support the claim that there is a difference.

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 test compares two groups of birds.

7 pairs are in the first group and 6 pairs in the second group.

The samples cannot contain paired data, because he sample sizes differ.

Thus the t-statistic is then the two-sample t statistic.

$$\boxed{\text{Two-sample } t \text{ statistic}}$$

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

Given:

$$t = -1.05$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 \neq \mu_2$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(7 - 1, 6 - 1) = 5$$

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 $df = 5$:

$$0.30 = 2 \times 0.15 < P < 2 \times 0.20 = 0.40$$

If the P-value is less than or equal to 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 of a difference.

There is not sufficient evidence to support the claim of a difference.

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

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

$$\overline{x}_1 = 4$$
$$\overline{x}_2 = 11.3$$

n is the number of values in the data set.

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

$$s_1 = 3.1093$$
$$s_2 = 3.9256$$

2

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 < \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{4 - 11.3}{\sqrt{\frac{3.1093^2}{6} + \frac{3.9256^2}{7}}} \approx -3.739$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(7 - 1, 6 - 1) = 5$$

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 $df = 5$:

$$0.005 < P < 0.01$$

If the P-value is less than or equal to 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 that the food-supplemented females were more out of synchrony with the caterpillar peak than the controls.

There is sufficient evidence to support the claim that the food-supplemented females were more out of synchrony with the caterpillar peak than the controls..

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

Sarah Schrijvers

?

Solution

The test compares one group of birds in two different years, thus there will be two samples.

The same birds are in each sample and thus the samples contain paired data.

Thus the t-statistic is then the paired t statistic.

Paired t statistic

0
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

?

Solution

Given for the control group:

$$t = 0.63$$

Determine the degrees of freedom:

$$df = n_1 - 1 = 6 - 1 = 5$$

Given for the supplemented group:

$$t = -2.63$$

Determine the degrees of freedom:

$$df = n_1 - 1 = 7 - 1 = 6$$

Control group: $t = 0.63$ and $df = 5$
Supplemented group: $t = -2.63$ and $df = 6$

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

Sarah Schrijvers

?

Solution

1

Given:

$$t = 0.63$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

Determine the degrees of freedom:

$$df = n_1 - 1 = 6 - 1 = 5$$

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 $df = 5$:

$$P > 0.25$$

If the P-value is less than or equal to 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 that the birds in the control group did not advance their laying date in the second year.

2

Given:

$$t = -2.63$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 < \mu_2$$

Determine the degrees of freedom:

$$df = n_2 - 1 = 7 - 1 = 6$$

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 $df = 6$:

$$0.01 < P < 0.02$$

If the P-value is less than or equal to the significance level, then the null hypothesis is rejected:

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

There is sufficient evidence to support that the birds in the supplemented group appear to change their laying date.

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

Sarah Schrijvers

?

Solution

The center for Activities seems to be higher than the center for Control, because Activities has a higher mean and the boxplot lies more to the right.

The spread for the Control group seems to be more than the spread for the Activities group, because it has a higher standard deviation and the width between the whiskers of the boxplot is more.

The distributions appear to be both left-skewed, because the median (line in the box of the boxplot) appears to be more to the right in the box of the boxplot.

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

Given

$$\overline{x}_1 = 51.4762$$
$$\overline{x}_2 = 41.5217$$
$$s_1 = 11.0074$$
$$s_2 = 17.1487$$
$$n_1 = 21$$
$$n_2 = 23$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{51.4762 - 41.5217}{\sqrt{\frac{11.0074^2}{21} + \frac{17.1487^2}{23}}} \approx 2.311$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(21 - 1, 23 - 1) = 20$$

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 $df = 20$:

$$0.01 < P < 0.02$$

If the P-value is less than or equal to 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 that the mean DRP score is significantly higher for the students who did the reading activities.

Yes

0

Ex. 51c

Go to Page: 655 Go

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

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Solution

Yes, because the data was collected by using a randomized experiment and causation can be proved by a randomized experiment.

Yes

0

Comments

Have a comment? Type it here ...

Submit

LittleTurtle

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Solution

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

Sarah Schrijvers

?

Solution

Given

$$\bar{x}_1 = 51.4762$$
$$\bar{x}_2 = 41.5217$$
$$s_1 = 11.0074$$
$$s_2 = 17.1487$$
$$n_1 = 21$$
$$n_2 = 23$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(21 - 1, 23 - 1) = 20$$

Determine t^* with $df = 20$ and $c = 95\%$ using table B:

$$t^* = t_{\alpha/2} = 2.086$$

The endpoints of the confidence interval for $\mu_1 - \mu_2$ are:

$$(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (51.4762 - 41.5217) - 2.086\sqrt{\frac{11.0074^2}{21} + \frac{17.1487^2}{23}} \approx 0.9688$$

$$(\bar{x}_1 - \bar{x}_2) + t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (51.4762 - 41.5217) + 2.086\sqrt{\frac{11.0074^2}{21} + \frac{17.1487^2}{23}} \approx 18.9402$$

We are 95% confident that the mean difference is between 0.9688 and 18.9402.

$$(0.9688, 18.9402)$$

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 center for Notpregnant seems to be higher than the center for Breastfeed, because Nonpregnant has a higher mean and the boxplot lies more to the right.

The spread for the Breastfeed group seems to be more than the spread for the Nonpregnant group, because it has a higher standard deviation and the width between the whiskers of the boxplot is more.

The distributions appear to be both right-skewed, because the median (line in the box of the boxplot) appears to be more to the left in the box of the boxplot.

See explanation

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

Sarah Schrijvers

?

Solution

Given

$$\overline{x}_1 = -3.58723$$
$$\overline{x}_2 = 0.309091$$
$$s_1 = 2.50561$$
$$s_2 = 1.29832$$
$$n_1 = 47$$
$$n_2 = 22$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 < \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{-3.58723 - 0.309091}{\sqrt{\frac{2.50561^2}{47} + \frac{1.29832^2}{22}}} \approx -8.499$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(47 - 1, 22 - 1) = 21$$

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 $df = 20$:

$$P < 0.0005$$

If the P-value is less than or equal to 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 that the mean change in BMC is significantly lower for the mothers who are breast-feeding.

Yes

0

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

Sarah Schrijvers

?

Solution

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Observational study

Since the study is not an experiment, we cannot conclude anything about causation.

No

0
Comments

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given

$$\bar{x}_1 = -3.58723$$
$$\bar{x}_2 = 0.309091$$
$$s_1 = 2.50561$$
$$s_2 = 1.29832$$
$$n_1 = 47$$
$$n_2 = 22$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(47 - 1, 22 - 1) = 21$$

Determine t^* with $df = 21$ and $c = 95\%$ using table B:

$$t^* = t_{\alpha/2} = 2.080$$

The endpoints of the confidence interval for $\mu_1 - \mu_2$ are:

$$(\bar{x}_1 - \bar{x}_2) - t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (-3.58723 - 0.309091) - 2.080 \cdot \sqrt{\frac{2.50561^2}{47} + \frac{1.29832^2}{22}} \approx -4.850$$

$$(\bar{x}_1 - \bar{x}_2) + t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (-3.58723 - 0.309091) + 2.080 \cdot \sqrt{\frac{2.50561^2}{47} + \frac{1.29832^2}{22}} \approx -2.943$$

We are 95% confident that the mean difference is between -4.850 and -2.943.

$$(-4.850, -2.943)$$

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

$$\overline{x}_1 = 16177$$
$$\overline{x}_2 = 16569$$
$$s_1 = 7520$$
$$s_2 = 9108$$
$$n_1 = 56$$
$$n_2 = 56$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 \neq \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{16177 - 16569}{\sqrt{\frac{7520^2}{56} + \frac{9108^2}{56}}} \approx -0.248$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(56 - 1, 56 - 1) = 55 > 50$$

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 $df = 20$:

$$P > 2 \times 0.25 = 0.50$$

If the P-value is less than or equal to 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 of a difference.

No

0

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

Sarah Schrijvers

?

Solution

Given

$$\overline{x}_1 = 16177$$
$$\overline{x}_2 = 16569$$
$$s_1 = 7520$$
$$s_2 = 9108$$
$$n_1 = 56$$
$$n_2 = 56$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 \neq \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{16177 - 16569}{\sqrt{\frac{7520^2}{56} + \frac{9108^2}{56}}} \approx -0.248$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(56 - 1, 56 - 1) = 55 > 50$$

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 $df = 20$:

$$P > 2 \times 0.25 = 0.50 = 50\%$$

This means that the probability of obtaining a sample with mean difference of $16177 - 16569 = -392$ or more extreme is higher than 50%, if the population means are equal.

If the population means are equal, then the probability of obtaining a sample with mean difference of $16177 - 16569 = -392$ or more extreme is higher than 50%.

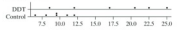
0
Comments

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

LittleTurtle
5.0

Solution

We want to perform a test at the $\alpha = 0.05$ significance level of $H_0 : \mu_1 - \mu_2 = 0$ versus $H_a : \mu_1 - \mu_2 \neq 0$ where μ_1 is the actual mean height of the second spike in rats given DDT and μ_2 is the actual mean height of the second spike in control rats. *Plan:* We should use a two-sample t test if the conditions are satisfied. Random: This was a randomized controlled experiment. Normal: Both samples had less than 30 observations. The dotplot below shows that neither group has strong skewness or outliers. Independent: Due to the random assignment, these two groups of rats can be viewed as independent. Individual observations in each group should also be independent: knowing the height of one rat's second spike gives no information about the height of another rat's second spike. The conditions are met.



Do: From the computer output, $t = 2.9912$. The computer is using 5.9 degrees of freedom and reports the P-value to be 0.0247. This is the P-value for the two-sided test. *Conclude:* Since the P-value is less than 0.05, we reject the null hypothesis. We have enough evidence to conclude that the actual mean height of the second spike is different for rats poisoned with DDT and control rats.

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

If the actual mean
height of the second spike were the same for these two populations of rats, there would be about a 2.47% chance of observing a difference between the means as large as or larger than the one in this study.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers
?

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given

$$\overline{x}_1 = 4.182$$
$$\overline{x}_2 = 3.010$$
$$s_1 = 0.479$$
$$s_2 = 0.959$$
$$n_1 = 10$$
$$n_2 = 8$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{4.182 - 3.010}{\sqrt{\frac{0.479^2}{10} + \frac{0.959^2}{8}}} \approx 3.156$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(10 - 1, 8 - 1) = 7$$

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 $df = 20$:

$$0.005 < P < 0.01$$

(In the output we note that the exact P-value is $0.0104/2 = 0.0052$, since the test is one-sided and the P-value in the output is two-sided).

If the P-value is less than or equal to 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 that the knee velocity would be higher for skilled rowers.

Yes

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

Sarah Schrijvers

?

Solution

Given

$$\overline{x}_1 = 4.182$$
$$\overline{x}_2 = 3.010$$
$$s_1 = 0.479$$
$$s_2 = 0.959$$
$$n_1 = 10$$
$$n_2 = 8$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(10 - 1, 8 - 1) = 7$$

Determine t^* with $df = 7$ and $c = 90\%$ using table B:

$$t^* = 1.895$$

The endpoints of the confidence interval for $\mu_1 - \mu_2$ are:

$$(\overline{x}_1 - \overline{x}_2) - t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (4.182 - 3.010) - 1.895 \cdot \sqrt{\frac{0.479^2}{10} + \frac{0.959^2}{8}} \approx 0.4683$$

$$(\overline{x}_1 - \overline{x}_2) + t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (4.182 - 3.010) + 1.895 \cdot \sqrt{\frac{0.479^2}{10} + \frac{0.959^2}{8}} \approx 1.8757$$

We are 90% confident that the mean difference is between 0.4683 and 1.8757.

$$(0.4683, 1.8757)$$

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

Technology uses a higher degrees of freedom than we would use when using table B and this would lead to a smaller t-value t^* for Technology.

Since Technology has a smaller t^* value, the confidence interval by using Technology is narrower than the confidence interval by using table B.

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

Given

$$\overline{x}_1 = 70.37$$
$$\overline{x}_2 = 68.45$$
$$s_1 = 6.10$$
$$s_2 = 9.04$$
$$n_1 = 10$$
$$n_2 = 8$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 \neq \mu_2$$

Determine the test statistic:

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{70.37 - 68.45}{\sqrt{\frac{6.10^2}{10} + \frac{9.04^2}{8}}} \approx 0.5143$$

$$t = 0.5143$$

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

Sarah Schrijvers

?

Solution

Given

$$\bar{x}_1 = 70.37$$
$$\bar{x}_2 = 68.45$$
$$s_1 = 6.10$$
$$s_2 = 9.04$$
$$n_1 = 10$$
$$n_2 = 8$$

Determine the hypothesis:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 \neq \mu_2$$

Determine the test statistic:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{70.37 - 68.45}{\sqrt{\frac{6.10^2}{10} + \frac{9.04^2}{8}}} \approx 0.5143$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(10 - 1, 8 - 1) = 7$$

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 $df = 7$:

$$P > 2 \times 0.25 = 0.50$$

(The output gives a P-value of 0.6165).

If the P-value is less than or equal to 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 of a difference.

No

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

Sarah Schrijvers

?

Solution

Determine the degrees of freedom using the conservative approach:

$$df = \min(n_1 - 1, n_2 - 1) = \min(10 - 1, 8 - 1) = 7$$

We note that the degrees of freedom is less than the degrees of freedom in the output of 11.8.

A lower degree of freedom leads to a higher P-value.

Higher P-value

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 subjects are randomly assigned to the two treatment groups to make sure that the two treatment groups are as similar as possible and to eliminate the effect of any variables that were not measured.

See explanation

0

Comments

Have a comment? Type it here ...

Submit

LittleTurtle

?

Ex. 57b

Go to Page: 657 Go

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

Sarah Schrijvers

?

Solution

On the dot plot we note that almost no dots lie above 4.15 and to its right.

This means that it is rare to obtain a sample mean difference of 4.15 and thus we conclude that the mean appears to be significantly higher for those with internal reasons than for those with external reasons.

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

Determine the hypotheses:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

In exercise 57b, we concluded that the means were significantly different and thus the null hypothesis H_0 was rejected.

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

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

Since we rejected the null hypothesis H_0, we could have only made a Type I error.

$$\text{Type } I \text{ error}$$

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

Sarah Schrijvers

?

Solution

The subjects are randomly assigned to the two groups to make sure that the two groups are as similar as possible and to eliminate the effect of any variables that were not measured.

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

On the dot plot we note that almost no dots lie above 15.92 and to its right.

This means that it is rare to obtain a sample mean difference of 4.15 and thus we conclude that the mean appears to be significantly higher for those who were allowed to sleep than those who were sleep deprived.

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

Determine the hypotheses:

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

In exercise 57b, we concluded that the means were significantly different and thus the null hypothesis H_0 was rejected.

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

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

Since we rejected the null hypothesis H_0, we could have only made a Type I error.

$$\boxed{\text{Type } I \text{ error}}$$

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

Sarah Schrijvers

?

Solution

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Two-sample t procedures

because each sample contains different tires.

$$\boxed{\text{Two-sample } t \text{ procedures}}$$

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

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Paired t procedures

because each subject is in both samples.

Paired t procedures

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

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Two-sample t procedures

because each sample contains different subjects.

Two-sample t procedures

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

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Paired t procedures

because each subject has a littermate in the other sample.

Paired t procedures

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

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Two-sample t procedures

because each sample contains different subjects.

Two-sample t procedures

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

If every value in one sample has a corresponding value in the other sample, then we use paired t procedures, else we use the two-sample t procedures.

Two-sample t procedures

because each sample contains different subjects.

Two-sample t procedures

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

In general:

One proportion: one-sample z test/interval
Two proportions: two-sample z test/interval
One mean: one-sample t test/interval
Two means: two-sample t test/interval

Use a test if you want to test for a difference, equality, increase or decrease. Use an interval if you want to estimate an interval in which the true value lies.

One-sample z interval for a proportion

because we want to estimate the true value of one proportion (percent).

$\boxed{\text{One-sample } z \text{ interval for a proportion}}$

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

In general:

One proportion: one-sample z test/interval

Two proportions or proportion difference: two-sample z test/interval

One mean: one-sample t test/interval

Two means or mean difference: two-sample t test/interval

Two means or mean difference with paired data in the two samples: paired t test/interval

Use a test if you want to test for a difference, equality, increase or decrease. Use an interval if you want to estimate an interval in which the true value lies.

Paired t test for the mean difference

because we want to test for an increase between two means.

Paired t test for the mean difference

0

Comments

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

LittleTurtle 5.0

Solution

Paired t interval for the mean difference.

See explanation for result.

0
Comments

Have a comment? Type it here ...

Submit

Sarah Schrijvers ?

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

Sarah Schrijvers

?

Solution

In general:

One proportion: one-sample z test/interval

Two proportions or proportion difference: two-sample z test/interval

One mean: one-sample t test/interval

Two means or mean difference: two-sample t test/interval

Two means or mean difference with paired data in the two samples: paired t test/interval

Use a test if you want to test for a difference, equality, increase or decrease. Use an interval if you want to estimate an interval in which the true value lies.

Two-sample z interval for the proportion difference

because we want to estimate the difference in proportions.

Two-sample z interval for the proportion difference

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

$$\overline{x}_1 = 68.7$$
$$\overline{x}_2 = 54.1$$
$$s_1 = 13.3$$
$$s_2 = 11.93$$
$$n_1 = 15$$
$$n_2 = 14$$

Determine the hypothesis:

$$H_0 : \mu_1 - \mu_2 = 10$$
$$H_a : \mu_1 - \mu_2 > 10$$

Determine the test statistic:

$$t = \frac{(\overline{x}_1 - \overline{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{(68.7 - 54.1) - 10}{\sqrt{\frac{13.3^2}{15} + \frac{11.93^2}{14}}} \approx 0.982$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(15 - 1, 14 - 1) = 13$$

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 $df = 13$:

$$0.15 < P < 0.20$$

If the P-value is less than or equal to 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 that the mean cholesterol reduction with the new drug is more than 10 milligrams per deciliter.

There is not sufficient evidence to support the claim that the mean cholesterol reduction with the new drug is more than 10 milligrams per deciliter.

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

Sarah Schrijvers

?

Solution

Determine the hypotheses:

$$H_0 : \mu_1 - \mu_2 = 10$$

$$H_a : \mu_1 - \mu_2 > 10$$

In exercise 65a, the null hypothesis H_0 was rejected.

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

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

Since we failed to reject the null hypothesis H_0, we could have only made a Type II error.

$$\boxed{\text{Type } II \text{ error}}$$

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

$$\overline{x}_1 = 1.64$$
$$\overline{x}_2 = 1.09$$
$$s_1 = 0.29$$
$$s_2 = 0.18$$
$$n_1 = 30$$
$$n_2 = 30$$

Determine the hypothesis:

$$H_0 : \mu_1 - \mu_2 = 0.5$$
$$H_a : \mu_1 - \mu_2 > 0.5$$

Determine the test statistic:

$$t = \frac{(\overline{x}_1 - \overline{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{(1.64 - 1.09) - 0.5}{\sqrt{\frac{0.29^2}{30} + \frac{0.18^2}{30}}} \approx 0.802$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(30 - 1, 30 - 1) = 29$$

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 $df = 29$:

$$0.20 < P < 0.25$$

If the P-value is less than or equal to 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 that the new pressure-assisted toilet reduces the average amount of water used by more than 0.5 gallon per flush when compared to its current model.

There is not sufficient evidence to support the claim that the new pressure-assisted toilet reduces the average amount of water used by more than 0.5 gallon per flush when compared to its current model.

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Determine the hypotheses:

$$H_0 : \mu_1 - \mu_2 = 0.5$$

$$H_a : \mu_1 - \mu_2 > 0.5$$

In exercise 66a, the null hypothesis H_0 was rejected.

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

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

Since we failed to reject the null hypothesis H_0, we could have only made a Type II error.

$$\boxed{\text{Type } II \text{ error}}$$

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

Sarah Schrijvers
3.0

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

Sarah Schrijvers

5.0

Solution

In general:

One proportion: one-sample z test/interval

Two proportions or proportion difference: two-sample z test/interval

One mean: one-sample t test/interval

Two means or mean difference: two-sample t test/interval

Two means or mean difference with paired data in the two samples: paired t test/interval

Use a test if you want to test for a difference, equality, increase or decrease. Use an interval if you want to estimate an interval in which the true value lies.

Paired t test for μ_d

because both methods are used on the same random sample.

(a) Paired t test for μ_d

0
Comments

Have a comment? Type it here ...

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

The hypothesis are statements about the population parameter(s).

The population parameter is the population mean μ.

The null hypothesis states that the two population parameters are equal:

$$H_0 : \mu_M = \mu_F$$

The alternative hypothesis states the opposite of the null hypothesis according to the claim. The claim states that men are more prone to road rage than woman:

$$H_0 : \mu_M > \mu_F$$

$$\text{(a) } H_0 : \mu_M = \mu_F, \; H_0 : \mu_M > \mu_F$$

0

Comments

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Result exercise 69:

$$H_0 : \mu_M = \mu_F$$
$$H_0 : \mu_M > \mu_F$$

Given:

$$t = 3.18$$
$$n_1 = n_M = 596$$
$$n_2 = n_F = 523$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(596 - 1, 523 - 1) = 522 > 100$$

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 $df = 100$:

$$0.0005 < P < 0.001$$

(b) $0.0005 < P < 0.001$

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

Sarah Schrijvers

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Solution

The confidence interval is about one proportion (the proportion of students who were coached) and thus the one-sample z interval should be used instead of the two-sample z interval.

Given:

$$\hat{p} = \frac{427}{3160} \approx 0.135$$
$$n = 3160$$
$$c = 99\% = 0.99$$

For confidence level $1 - \alpha = 0.99$, determine $z_{\alpha/2} = z_{0.005}$ using table II (look up 0.005 in the table, the z-score is then the found z-score with opposite sign):

$$z_{\alpha/2} = 2.575$$

The margin of error is then:

$$E = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 2.575 \times \sqrt{\frac{0.135(1-0.135)}{3160}} \approx 0.016$$

The confidence interval then becomes:

$$0.119 = 0.135 - 0.016 = \hat{p} - E < p < \hat{p} + E = 0.135 + 0.016 = 0.151$$

$$\boxed{0.119 < p < 0.151}$$

0
Comments

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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

If every value in one sample has a corresponding value in the other sample, then we use the paired t test, else we use the two-sample t test.

Paired t test

because each subject is in both samples.

Paired t test

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Comments

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LittleTurtle

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There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

Solution

Given

$$\bar{x}_d = 29$$
$$s_d = 59$$
$$n = 427$$

Determine the mean and the standard deviation of the differences.

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

Determine the value of the test statistic:

$$t = \frac{\bar{d}}{s_d/\sqrt{n}} = \frac{29}{59/\sqrt{427}} \approx 10.157$$

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 $df = n - 1 = 427 - 1 = 426 > 100$:

$$P < 0.0005$$

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

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

There is sufficient evidence to support the claim that the coaching increased their scores.

There is sufficient evidence to support the claim that the coaching increased their scores.

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

$$\bar{x}_d = 29$$
$$s_d = 59$$
$$n = 427$$
$$c = 99\%$$

Determine the t_c using table B with $df = n - 1 = 426 - 1 = 425 > 100$ and $c = 99\%$:

$$t_c = 2.626$$

The endpoints of the confidence interval are then:

$$\bar{d} - t_{\alpha/2} \cdot \frac{s_d}{\sqrt{n}} = 29 - 2.626 \cdot \frac{59}{\sqrt{427}} \approx 21.502$$
$$\bar{d} + t_{\alpha/2} \cdot \frac{s_d}{\sqrt{n}} = 29 + 2.626 \cdot \frac{59}{\sqrt{427}} \approx 36.498$$

We are 99% confident that the true population mean difference is between 21.502 and 36.498.

$$(21.502, 36.498)$$

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 $H_0: \mu_1 - \mu_2 = 0$ versus $H_a: \mu_1 - \mu_2 > 0$ where μ_1 is the actual mean increase in SAT verbal scores for coached students and μ_2 is the actual mean increase in SAT verbal scores for students who were not coached. *Plan:* We should use a two-sample t test if the conditions are satisfied. Random: Both samples were randomly selected. Normal: Both samples had at least 30 observations. Independent: Both samples are less than 10% of their respective populations (there are more than 4270 students taking the SAT twice who were coached and 27,330 students taking the SAT twice who were not coached). The conditions are met. *Do:* From the data we find that $n_1 = 427$, $\bar{x}_1 = 29$, $s_1 = 59$, $n_2 = 2733$, $\bar{x}_2 = 21$, and $s_2 = 52$. We will use the conservative degrees of freedom which is 426 in this case. The test statistic is

$$t = \frac{(29-21)-0}{\sqrt{\frac{(59)^2}{427} + \frac{(52)^2}{2733}}} = 2.646.$$ Since this is a one-sided test the P-value is $P(t > 2.646) = 0.0042$.

Conclude: Since the P-value is less than 0.05, we reject the null hypothesis. We have enough evidence to conclude that students who receive coaching had a higher mean increase in scores on the SAT verbal exam than those who did not receive coaching.

See explanation for result.

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Comments

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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

$$\overline{x}_1 = 29$$
$$\overline{x}_2 = 21$$
$$s_1 = 59$$
$$s_2 = 52$$
$$n_1 = 427$$
$$n_2 = 2733$$

Determine the degrees of freedom:

$$df = \min(n_1 - 1, n_2 - 1) = \min(427 - 1, 2733 - 1) = 426 > 100$$

Determine t^* with $df = 100$ and $c = 99\%$ using table B:

$$t^* = 2.626$$

The endpoints of the confidence interval for $\mu_1 - \mu_2$ are:

$$(\overline{x}_1 - \overline{x}_2) - t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (29 - 21) - 2.626 \cdot \sqrt{\frac{59^2}{427} + \frac{52^2}{2733}} \approx 0.0603$$

$$(\overline{x}_1 - \overline{x}_2) + t_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = (29 - 21) + 2.626 \cdot \sqrt{\frac{59^2}{427} + \frac{52^2}{2733}} \approx 15.9397$$

We are 99% confident that the mean difference is between 0.0603 and 15.9397.

$$(0.0603, 15.9397)$$

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

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Solution

Result exercise 72b:

$$(0.0603, 15.9397)$$

The confidence interval lies very close to 0 and thus there does not seem to be a large gain for the coaching. Then coaching courses do not seem worth paying for.

No

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Comments

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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

The people who responded might have a very different result than those who did not respond. For example, people with very low scores will most likely be to embarrassed to respond.

Since the scores of the nonresponders could be very different from the scores of the responders, the true values and conclusions might be very different for the two groups.

Thus the results cannot be generalized for the entire population.

See explanation

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Comments

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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

1

An experiment deliberately imposes some treatment on individuals in order to observe their responses.

An observational study tries to gather information without disturbing the scene they are observing.

Observational study

2

An observational study cannot prove causation, only an experiment is capable of proving causation.

See explanation

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Comments

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

Sarah Schrijvers

?

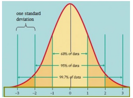
Solution

1

Given: Random samples vary Normally around the target mean μ with a standard deviation σ.

The 68-95-99.7-rule tells us that 95% of the sample means is within 2 standard deviations of the mean and thus 5% of the samples mean is more than 2 standard deviations of the mean.

$$P(\text{within 2 standard deviations from the mean}) = 95\% = 0.95$$
$$P(\text{more than 2 standard deviations from the mean}) = 5\% = 0.05$$



2

Multiplication rule:

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

Let X be the number of sample means that are more than 2 standard deviations from the mean.

$$P(X = 0) = P(\text{within 2 standard deviations from the mean})^2 = 0.95^2 = 0.9025$$

Complement rule:

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

We can then determine the probability of having at least one of the two sample means more than 2 standard deviations from the mean.

$$P(X \geq 1) = 1 - P(X = 0) = 1 - 0.9025 = 0.0975$$

There are 2 solutions for this exercise.

Please see your textbook for the exercise prompt.

Sarah Schrijvers

?

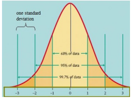
Solution

Given: Random samples vary Normally around the target mean μ with a standard deviation σ.

The 68-95-99.7-rule tells us that 95% of the sample means is within 2 standard deviations of the mean and thus 5% of the sample means is more than 2 standard deviations of the mean.

Since the normal distribution is symmetric about its mean, 2.5% of the sample means is greater than $\mu + 2\sigma$.

$$P(\text{greater than } \mu + 2\sigma) = 2.5\% = 0.025$$
$$P(\text{less than } \mu + 2\sigma) = 97.5\% = 0.975$$



Multiplication rule:

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

If the fourth sample is the first sample with a mean greater than $\mu + 2\sigma$, then the three previous samples had a mean less than $\mu + 2\sigma$.

$$P(\text{First greater than } \mu{+}2\sigma \text{ on forth sample}) = P(\text{less than } \mu{+}2\sigma)^3 \times P(\text{greater than } \mu{+}2\sigma)$$
$$= 0.975^3 \times 0.025 \approx 0.0232$$