

AP Statistics - Inference for the Difference of Two Proportions - Worksheet

Common Core AP STAT 6.8, AP STAT 6.9, AP STAT 6.10, AP STAT 6.11, HSS-IC.B.5 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice AP Statistics topics 6.8 to 6.11. You will check conditions for two proportions, build and interpret two-sample z intervals, run pooled z tests, and use intervals to judge claims about $p_1 - p_2$.

AP Statistics · Common Core State Standards: **AP STAT 6.8, AP STAT 6.9, AP STAT 6.10, AP STAT 6.11, HSS-IC.B.5**

Exercise 1 - State the parameters

	Support	Do not support
School A	126	174
School B	90	160

Survey results for two independent random samples.

Using the survey table, define the parameters p_A and p_B and write the null and alternative hypotheses for testing whether the proportions differ.

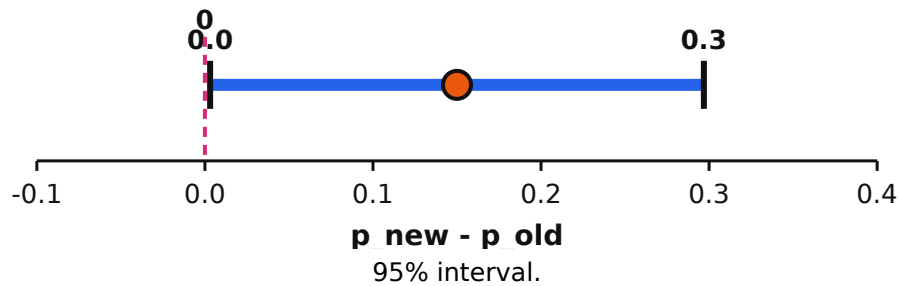
Exercise 2 - Check conditions

An experiment randomly assigns 80 volunteers to a new app and 90 to an old app. Of the 80, 52 improve; of the 90, 45 improve. Check the conditions for a two-proportion procedure.

Exercise 3 - Difference and standard error

For the app experiment, find the sample proportions, their difference (new minus old), and the standard error.

Exercise 4 - Confidence interval



Construct a 95% confidence interval for $p_{\text{new}} - p_{\text{old}}$ in the app experiment.

Exercise 5 - Interpret the interval

Interpret the interval (0.003, 0.297) in context and say whether it suggests a difference between the apps.

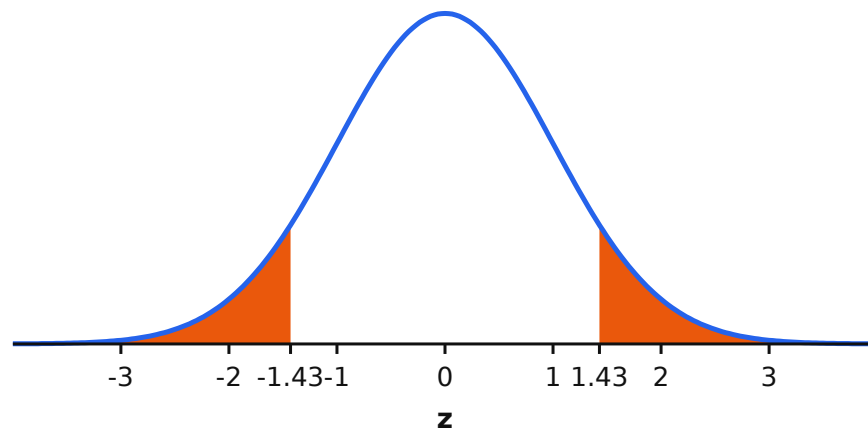
Exercise 6 - 90 percent interval

In random samples, 180 of 400 adults in a city and 150 of 400 adults in a neighboring city say they recycle regularly. Find a 90% confidence interval for the difference (first city minus second).

Exercise 7 - Pooled proportion

For $H_0: p_1 = p_2$, with 126 successes of 300 in sample 1 and 90 of 250 in sample 2, find the pooled proportion and the pooled standard error.

Exercise 8 - z statistic and p-value



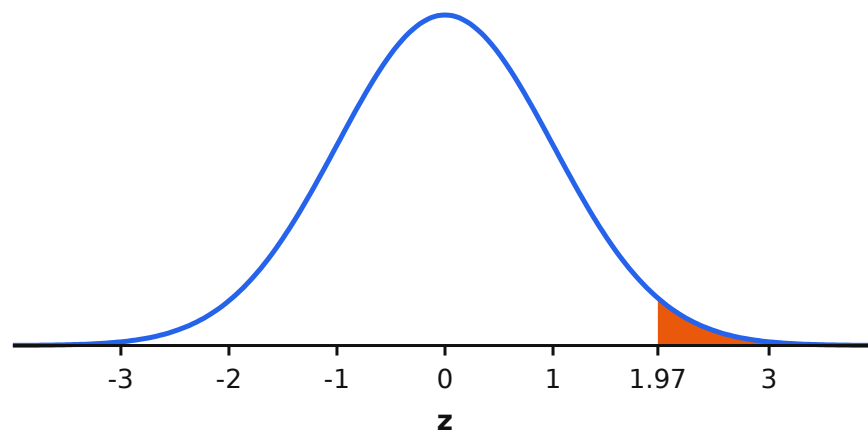
Two-sided p-value for $z = 1.43$: 0.1527.

Complete the test for the school surveys: find z and the two-sided p-value.

Exercise 9 - Conclusion

Using $\alpha = 0.05$, write a conclusion for the school survey test (p-value 0.1527).

Exercise 10 - One-sided test



Right-tailed p-value.

Test whether the new app improves a higher proportion than the old app (52 of 80 compared with 45 of 90) at $\alpha = 0.05$.

Exercise 11 - Interval and test agree

A 95% interval for $p_1 - p_2$ is (0.01, 0.15). A two-sided test of $H_0: p_1 = p_2$ at $\alpha = 0.05$ is run. What is the conclusion?

Exercise 12 - Two-way table

	Got flu	No flu
Vaccinated	18	282
Placebo	45	255

Flu study results.

In a randomized experiment, 300 volunteers got a flu vaccine and 300 got a placebo. Find the sample proportions who got the flu and a 95% interval for $p_{\text{placebo}} - p_{\text{vaccine}}$.

Exercise 13 - Significance in the flu study

For the flu experiment, a test of $H_0: p_{\text{vaccine}} = p_{\text{placebo}}$ versus $H_a: p_{\text{vaccine}} < p_{\text{placebo}}$ gives $z = -3.60$. Find the p-value and state the conclusion.

Exercise 14 - Large counts fails

In a sample of 60 teens, 4 own a drone. In another sample of 50 adults, 9 own one. Which condition fails for a two-proportion z procedure?

Exercise 15 - Dependent samples

A teacher gives 25 students a quiz before and after a lesson and compares the proportions that passed. Why is a two-proportion z procedure inappropriate?

Exercise 16 - Margin of error comparison

For the school surveys the interval (-0.022, 0.142) contains 0. Explain what a larger sample might do.

Exercise 17 - Sample proportions

A random sample of 200 men and 250 women is asked about electric cars: 90 men and 130 women say they would consider buying one. Compute $\hat{p}$ for each and the difference (women minus men).

Exercise 18 - Interval for the electric car survey

Find a 95% interval for $p_{\text{women}} - p_{\text{men}}$ and interpret it.

Exercise 19 - Test for the electric car survey

Test $H_0: p_{\text{women}} = p_{\text{men}}$ against a two-sided alternative at $\alpha = 0.05$ for the same data.

Exercise 20 - Multi-step

In one town, 72 of 150 voters in a random sample support a tax; in another, 60 of 160 do. Find the 99% interval for the difference and state whether the data suggest a difference.