LESSON MAKER PRO

Simulation Signal Check

Use simulated results to judge a difference.

HIGH SCHOOL · MA.912.DP.5.10

MA.912.DP.5.10 "Determine whether differences between parameters are significant using simulations."

NAME _____ DATE _____

THE BIG IDEA

Use simulations that assume there is no real difference between the population parameters. Find the fraction of simulated differences that are at least as far from 0 as the observed difference. If the fraction is 5% or less, the difference is significant.

WORKED EXAMPLE

Two groups have an observed difference of 14 percentage points. In 100 no-difference simulations, 4 differences were 14 points or farther from 0. Is the difference significant?

1. Extreme simulated results = 4.
2. Simulation rate = 4/100 = 4%.
3. Since 4% is at most 5%, the difference is significant.

Answer: Yes, significant.

PRACTICE 5 problems

1 An observed gap is 9 points. In 20 simulations, 1 gap is at least as extreme. Is it significant?

ANSWER _____

2 An observed gap is 15 points. In 25 simulations, 2 gaps are at least as extreme. Is it significant?

ANSWER _____

3 An observed gap is 7 points. In 75 simulations, 3 gaps are at least as extreme. Is it significant?

ANSWER _____

4 An observed gap is 11 points. In 40 simulations, 3 gaps are at least as extreme. Is it significant?

ANSWER _____

5 An observed gap is 16 points. In 400 simulations, 20 gaps are at least as extreme. Is it significant?

ANSWER _____

APPLY IT Show your work

1 A student council survey finds a 13-point difference in support for later start times between two grades. In 150 shuffled-label simulations, 6 differences are at least 13 points from 0. Is the difference significant?

WORK SPACE

ANSWER _____

2 An esports club finds a 10-point difference in the share of students who want weekend tournaments at two schools. In 120 no-difference simulations, 5 results are at least as extreme. Is the difference significant?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Study A has 7 extreme results out of 140 simulations. Study B has 9 extreme results out of 180 simulations. Which study gives stronger evidence of a real difference, or are they equal? Explain.

_____

_____

ANSWER KEY

Simulation Signal Check

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	An observed gap is 9 points. In 20 simulations, 1 gap is at least as extreme. Is it significant?	**Yes. 1/20 = 5%.**
2	An observed gap is 15 points. In 25 simulations, 2 gaps are at least as extreme. Is it significant?	**No. 2/25 = 8%.**
3	An observed gap is 7 points. In 75 simulations, 3 gaps are at least as extreme. Is it significant?	**Yes. 3/75 = 4%.**
4	An observed gap is 11 points. In 40 simulations, 3 gaps are at least as extreme. Is it significant?	**No. 3/40 = 7.5%.**
5	An observed gap is 16 points. In 400 simulations, 20 gaps are at least as extreme. Is it significant?	**Yes. 20/400 = 5%.**

PART 2 · APPLY IT

1. **Yes. 6/150 = 4%, so it is significant.** Divide 6 by 150. The simulated rate is below 5%.
2. **Yes. 5/120 = 1/24, about 4.2%, so it is significant.** Simplify 5/120 to 1/24. This is less than 5%.

CHALLENGE

They are equal. 7/140 = 1/20 = 5% and 9/180 = 1/20 = 5%, so both are significant at the 5% level.

Accept equivalent fractions, decimals, or percents. Treat a simulated rate of exactly 5% as significant.