

Inference for Proportions: Intervals and Tests

Grade 12 – AP Statistics math · Test · Standards: AP Statistics Unit 3 (2026-27)

Name: _____ Date: _____ Class: _____

This 45-minute test has eight AP-style questions worth 20 points. Check conditions, show formulas with numbers, and write each conclusion in context, linked to the p-value or interval.

Standards: AP Statistics Unit 3 (2026-27) · **Level:** Grade 12 AP Statistics

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Confidence Interval (3 points)

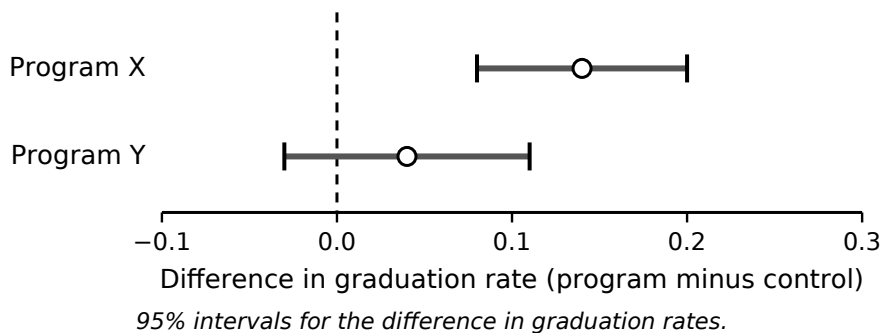
Among 400 randomly chosen registered voters in a large county, 158 plan to vote for a school bond. (a) Verify the conditions for a confidence interval. (b) Find a 95% interval estimate of the share of all county voters who plan to vote for the bond. (c) Explain what the interval says.

Question 2 Sample Size (2 points)

A researcher wants to estimate a population proportion using a 90% interval whose margin of error must not exceed 0.04. No prior estimate exists. Find the minimum sample size.

Question 3 Interval Justification (2 points)

Two programs were each compared with a control group. The graph displays 95% intervals for the difference in graduation rates (program minus control).



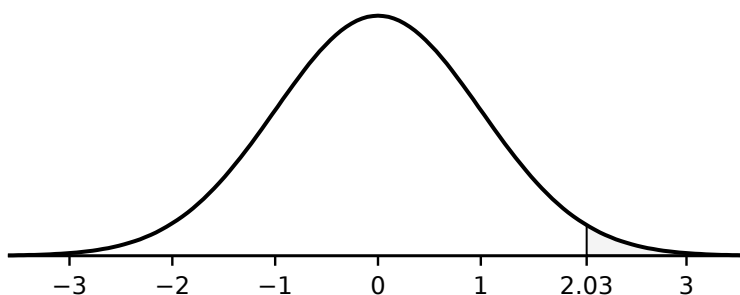
For each program, state whether the interval gives convincing evidence of a difference from the control, and explain.

Question 4 Significance Test (3 points)

A game designer says that a player wins 50% of rounds. Among 150 randomly chosen rounds of a very large number of plays, a player wins 61. Does the sample provide convincing evidence that the true win proportion differs from 0.50? Use $\alpha = 0.05$. (a) State the hypotheses and check conditions. (b) Find the test statistic and p-value. (c) State a conclusion in context.

Question 5 p-Value and Decision (2 points)

A test of $H_0: p = 0.30$ against $H_a: p > 0.30$ produces a p-value of 0.021 (see the curve, where the shaded tail corresponds to $z \approx 2.03$). (a) Explain the p-value for a survey of students who work part-time.



Upper-tail p-value.

(b) State the decision at $\alpha = 0.05$.

Question 6 Errors in Context (2 points)

A factory tests H_0 : the defect rate is 2% against H_a : the defect rate is more than 2%. Explain what each type of wrong decision would mean for the factory.

Question 7 Difference of Two Proportions (3 points)

In random samples, 52 of 130 students at school A and 36 of 120 at school B own a tablet. (a) Verify the conditions. (b) Find a 95% interval estimate of the difference in the proportions (A minus B). (c) Does the interval give convincing evidence of a difference? Explain.

Question 8 Power (3 points)

(a) Define the power of a significance test. (b) Give two different ways to raise the power of a test. (c) What is the cost of increasing the significance level α to increase power?