

AP[®] Statistics Inference Decision Guide

2027 College Board Course & Exam Description (CED) Aligned

Free Student Edition
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1. INFERENCE PROCEDURE MASTER DECISION MATRIX (UNITS 6-9)

Variable Type	Samples / Groups	Procedure Name	Test Statistic Formula	Critical Assumptions
Categorical (Proportions)	1 Sample	1-Sample z-test for p	$z = (\hat{p} - p_o) / \sqrt{p_o(1-p_o)/n}$	Random sample; 10% condition; $np_o \geq 10$ and $n(1-p_o) \geq 10$.
Categorical (Proportions)	2 Independent Samples	2-Sample z-test for $p_1 - p_2$	$z = (\hat{p}_1 - \hat{p}_2) / \sqrt{(\hat{p}c(1-\hat{p}c)(1/n_1 + 1/n_2))}$	Independent random samples; 10% condition; pooled counts ≥ 10 .
Quantitative (Means)	1 Sample (σ unknown)	1-Sample t-test for μ	$t = (\bar{x} - \mu_o) / (s / \sqrt{n}), df = n - 1$	Random sample; 10% condition; Normal population or $n \geq 30$ (CLT).
Quantitative (Means)	Paired Data (Before/After)	Matched Pairs t-test for μ_d	$t = (\bar{x}_d - 0) / (s_d / \sqrt{n}), df = n - 1$	Random paired sample; differences approximately normal or $n \geq 30$.
Quantitative (Means)	2 Independent Samples	2-Sample t-test for $\mu_1 - \mu_2$	$t = ((\bar{x}_1 - \bar{x}_2) - 0) / \sqrt{(s_1^2/n_1 + s_2^2/n_2)}$	Independent random samples; both populations normal or $n_1, n_2 \geq 30$.
Categorical Frequencies	1 Variable across multiple categories	Chi-Square Goodness of Fit	$\chi^2 = \sum (O - E)^2 / E, df = k - 1$	Random sample; all expected counts $E \geq 5$.
Two Categorical Variables	Single Sample (Association)	Chi-Square Test of Independence	$\chi^2 = \sum (O - E)^2 / E, df = (r-1)(c-1)$	Random sample; two-way table; all expected counts $E \geq 5$.
Bivariate Quantitative	Paired (x, y) coordinates	Linear Regression t-test for slope β	$t = (b - 0) / SE_b, df = n - 2$	LINER conditions: Linear, Independent, Normal residuals, Equal variance, Random.

2. FRQ OFFICIAL RUBRIC SENTENCE FRAMES

A. Interpreting Confidence Level (e.g. 95%):

"If this sampling procedure were repeated many times, approximately **95%** of the resulting confidence intervals would capture the true population [proportion/mean] of [parameter in context]."

B. Interpreting P-Value in Context:

"Assuming that the null hypothesis is true (that the true [parameter] equals [H_0 value]), there is a **[p-value]** probability of obtaining a test statistic as extreme as or more extreme than the observed one purely due to sampling variability."

C. Stating Inference Conclusion (Hypothesis Testing):

"Because our p-value [e.g. 0.021] is less than $\alpha = 0.05$, we **reject the null hypothesis**. There is convincing statistical evidence that [restate H_a in context]."

 **Exam Day Tip:** Never say "we accept H_0 " or " H_0 is proven true." College Board AP® graders penalize this phrasing. Always state "we fail to reject H_0 ."