AP Statistics Inference Reference Guide

AP Statistics · Mr. Merrick · February 2, 2026.

Confidence Intervals

Step 1 — State important information, and define the target

Write one sentence defining the parameter, in context:

- One proportion: Let p = the true proportion of _____.
- One mean: Let μ = the true mean of _____.
- Two proportions: Let $p_1 - p_2$ = the true difference in proportions of _____ and _____.
- Two means: Let $\mu_1 - \mu_2$ = the true difference in means of _____ and _____.

Then state: "We will construct a _____% confidence interval for (parameter)."

Step 2 — Justify the Method (Checking Conditions)

Name the interval procedure (be specific):
"We will use a _____ interval for _____."
Check and write the conditions explicitly:

- Random: data come from a random sample or random assignment: _____
- Independence: if sampling without replacement, $n \leq 0.10N$: _____
- Normal / Large Sample:
  - Proportions: $n\hat{p} \geq 10$ and $n(1-\hat{p}) \geq 10$
  - Means: population normal OR n large OR no strong skew/outliers
  - Paired data: differences are nearly normal

Finish with: "Since conditions are met, an interval is appropriate."

Step 3 — Carry Out the Procedure (Computation)

Generic form: estimate $\pm$ (critical value)(standard error)

- Identify the estimate.
- Find the correct critical value ($z^\star$ or $t^\star$).
- Compute the standard error.
- Report the interval: CI (_____, _____)

Step 4 — Interpret the Result (Meaning in Context)

Write one complete sentence:

- "We are _____% confident that the true (parameter) lies between _____ and _____."

Avoid these mistakes:

- Do not say "there is a % chance the parameter is in the interval."
- Interpret the population parameter, not the sample statistic.
- Keep the context in the sentence.

If you can identify Steps 1–4 in your solution, you are rubric-safe.

Hypothesis Tests

Step 1 — Define the Target (Parameter + Hypotheses + α)

Parameter in context (one sentence):

- Let p = the true proportion of _____.
- Let μ = the true mean of _____.
- Let $p_1 - p_2$ = the true difference in proportions of _____ and _____.
- Let $\mu_1 - \mu_2$ = the true difference in means of _____ and _____.

Significance level: $\alpha =$ _____

Hypotheses in symbols:

H_0 : *(parameter)* = _____ H_a : *(parameter)* $\{<, >, \neq\}$ _____

Step 2 — Justify the Method (Test + Conditions)

Name the test (be specific):

"We will perform a _____ test for _____."

Check and write the conditions:

- Random: random sample or random assignment: _____
- Independence: if sampling without replacement, $n \leq 0.10N$: _____
- Normal / Large Sample:
  - Proportions: $np_0 \geq 10$ and $n(1 - p_0) \geq 10$
  - Means: population normal OR large n OR no strong skew/outliers
  - Paired data: differences are nearly normal

Finish with: "Since conditions are met, this test is appropriate."

Step 3 — Carry Out the Procedure (Test Statistic + p-value)

- Write the test statistic formula.
- Substitute and compute the test statistic.
- Find the p-value using the correct direction.
- Report: test statistic _____ p-value _____

Step 4 — Interpret the Result (Decision + Context)

Decision rule:

- If p-value $< \alpha$, reject H_0.
- If p-value $\geq \alpha$, fail to reject H_0.

Write your conclusion in the following order:

1. **Decision:** State whether you reject or fail to reject H_0 based on the p-value and α.
2. **Statistical reason:** State whether there is sufficient or insufficient evidence at the stated significance level.
3. **Contextual conclusion:** Make a claim about the population parameter in context.
4. **P-value meaning:** Assuming H_0 is true, the p-value is the probability of observing a sample statistic at least as extreme as the one observed, due to random chance alone.

Avoid these mistakes:

- Do not say "prove" or "accept H_0".
- Make sure your conclusion matches the direction of H_a.