

# Which inference procedure?

AP® Statistics, five-unit course · the procedures tested on the May 2027 exam

UpTest!

START: Is the variable you are studying categorical or quantitative?

## CATEGORICAL

categories or yes/no answers, summarized with proportions or counts

Next: how many groups are there, and how are they related?

### One proportion z-interval or z-test for $p$

**Use when:** one random sample and one yes/no variable; the question is about the population proportion.

**Conditions:** Random · 10%:  $n \leq 10\%$  of  $N$  · Large Counts:  $np \geq 10$  and  $n(1-p) \geq 10$  (a test uses  $p_0$ ; an interval uses  $p\text{-hat}$ ).

**Cues:** “what percent of all...?” “is more than half...?”

### Two proportions two-sample z-interval or z-test for $p_1 - p_2$

**Use when:** two independent groups (two random samples, or two randomly assigned treatment groups) and the same yes/no variable.

**Conditions:** Random or randomized · Independent groups · 10% for each sample · Large Counts in each group: at least 10 successes and 10 failures (a test uses the combined, pooled  $p\text{-hat}$ ).

**Cues:** “difference in proportions,” “is the success rate higher for A than B?”

### Chi-square test homogeneity or independence, from a two-way table

**Use when:** comparing a categorical variable's distribution across groups (**homogeneity:** separate samples or treatment groups), or asking whether two categorical variables are related (**independence:** one sample, two variables).

**Conditions:** Random or randomized · 10% · All expected counts  $\geq 5$ .

**Cues:** “is there an association?” “is the distribution the same for...?” **Not on the 2027 exam: goodness-of-fit.**

## QUANTITATIVE

measurements, summarized with means

Next: how many groups are there, and how are they related?

### One mean one-sample t-interval or t-test for $\mu$

**Use when:** one random sample and one numerical variable; the question is about the population mean.

**Conditions:** Random · 10% · Normal or large sample:  $n \geq 30$ , or the data show no strong skew or outliers.

**Cues:** “what is the mean...?” “is the mean different from...?”

### Two means two-sample t-interval or t-test for $\mu_1 - \mu_2$

**Use when:** two independent groups (two random samples, or two randomly assigned groups) and a numerical response.

**Conditions:** Random or randomized · Independent groups · 10% for each sample · Normal or large sample ( $n \geq 30$ , or no strong skew or outliers) in each group.

**Cues:** “do students in A score higher on average than in B?”

### Matched pairs one-sample t on the differences, $\mu_d$

**Use when:** each unit gives **two related measurements** (before and after, twins, one subject under both treatments). Analyze the differences.

**Conditions:** Random pairs or random treatment order · 10% · Differences:  $n \geq 30$ , or no strong skew or outliers.

**Cues:** “before and after,” “the same students,” “paired.” **Not on the 2027 exam: slope inference.**

## EVERY INFERENCE ANSWER, EVERY TIME

### 1 Parameter and hypotheses

named in words, in context; hypotheses use the parameter, never a sample statistic

### 2 Procedure and conditions

name the procedure and give evidence from the problem for each condition

### 3 Statistic and p-value

show the formula with values substituted, or the interval, and your result

### 4 Conclusion in context

compare  $p$  to  $\alpha$ , say “convincing evidence,” and state it about the population