

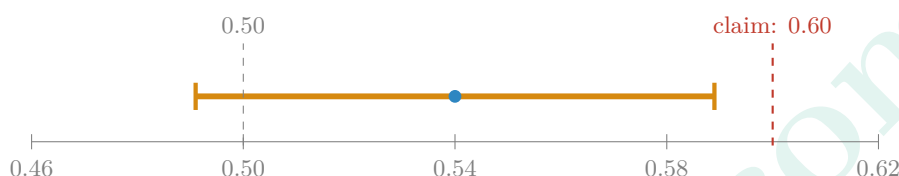
Judging a Claim with a Confidence Interval

AP Statistics | Unit 6 | plausible values, evidence, and what an interval cannot do

1. Inside is plausible, outside is not

A company claims that at least 60% of its customers are satisfied. In a random sample of 400 customers, 216 (54%) are satisfied. The 95% interval:

$$0.54 \pm 1.96 \sqrt{\frac{(0.54)(0.46)}{400}} = 0.54 \pm 0.049 \Rightarrow (0.491, 0.589).$$



The two cases

Claimed value **outside** the interval $\Rightarrow$ convincing evidence **against** the claim.

Claimed value **inside** the interval $\Rightarrow$ the claim is **plausible**: we do *not* have convincing evidence against it.

Always state whether the value is in the interval, then conclude in context.

- “**At least 60%**”: 0.60 is not in the interval, and every plausible value is below 0.60. *The data give convincing evidence that fewer than 60% of customers are satisfied.*
- “**A majority are satisfied**”: the interval includes values below 0.50, so the data do *not* give convincing evidence of a majority, even though $\hat{p} = 0.54$.

2. “Consistent with” is not “proves”

A claim of exactly 55% lies inside the interval. That makes it plausible, not proven: 0.50, 0.52 and 0.58 are inside too, and they cannot all be true. An interval can rule values *out*; it can never single one value *in*. Never write that an interval “proves” a claim or that the claim “is true”.

3. A bigger sample can change the verdict

$n = 400, \hat{p} = 0.54$ $(0.491, 0.589)$ includes values below 0.50: no evidence of a majority

$n = 1600, \hat{p} = 0.54$ $(0.516, 0.564)$ entirely above 0.50: convincing evidence of a majority

Same percentage, different verdict. The estimate did not change; the precision did.

4. What the margin of error does not cover

The margin of error accounts for **random sampling variability only**. It does not account for bias: undercoverage, nonresponse, voluntary response, or badly worded questions. That is why the first condition is always *random*.

Where students lose points

1. “The interval proves the claim.”
2. Judging by $\hat{p}$ alone and ignoring the interval.
3. Not stating whether the claimed value is in the interval.
4. A conclusion with no context.
5. Thinking the margin of error covers bias.

Now practise it

Theory sticks once you use it. On **sad-academy.com** you'll find practice questions for this exact subtopic in the AP format, and an AI that grades your free-response answers against the scoring guidelines, the way an AP reader would.

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