A manufacturing company claims that the average weight of its product is 500grams. To test this claim, a random sample of 25 products is selected, and their weights are measured. The sample mean weight is found to be 510 grams withasample standard deviation of 20 grams. Perform a hypothesis test to determine if there is evidence to support the company's claim. Data: Sample size (n) =25, Sample mean (x̄) = 510 grams, Sample standard deviation (s) = 20 grams, Population mean (μ) = 500 grams

Explanation: In this problem, we are conducting a hypothesis test to assess whether the sample mean weight provides evidence to support the company's claim about the population mean weight. The null hypothesis (H0) assumes that the population mean weight is equal to the claimed value, while the alternative hypothesis (Ha) suggests otherwise.

**Hypothesis test**

1. **State the hypotheses:**

Two‑sided test (the company says “the mean weight is 500 g” but we want to check if the mean is *different*).

1. **Significance level:**

Common choice α = 0.05*.*

1. **Test statistic:**

Because n = 25 < 30 and the population SD is unknown, use a *t*‑test.

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1. **Decision rule (critical‑value approach)**

**For df = 24 the two‑tailed critical value at α=0.05 is .**

1. **P‑value**

**Look up**

There is statistically significant evidence (at the 5 % level) that the true mean weight is **not** 500 g.  
The sample mean of 510 g is higher than the claimed 500 g, and the test rejects the company’s claim.

**95 % Confidence Interval**

The same data give a 95 % confidence interval for the population mean:

Because 500 g is **outside** this interval, the interval‑based inference agrees with the hypothesis‑testing result.