

Question

A null hypothesis claims a population has a mean $\mu = 19.0$. You decide to run two-tail test on a sample of size $n = 10$ using a significance level $\alpha = 0.05$.

You then collect the sample:

22.9	21	19.2	17.1	20.5
19.7	20.6	21.5	18.9	20.1

Answerlist

- Determine the p -value.
- Do you reject the null hypothesis?

Solution

State the hypotheses.

$$H_0 \text{ claims } \mu = 19$$

$$H_A \text{ claims } \mu \neq 19$$

Find the mean and standard deviation of the sample.

$$\bar{x} = 20.15$$

$$s = 1.578$$

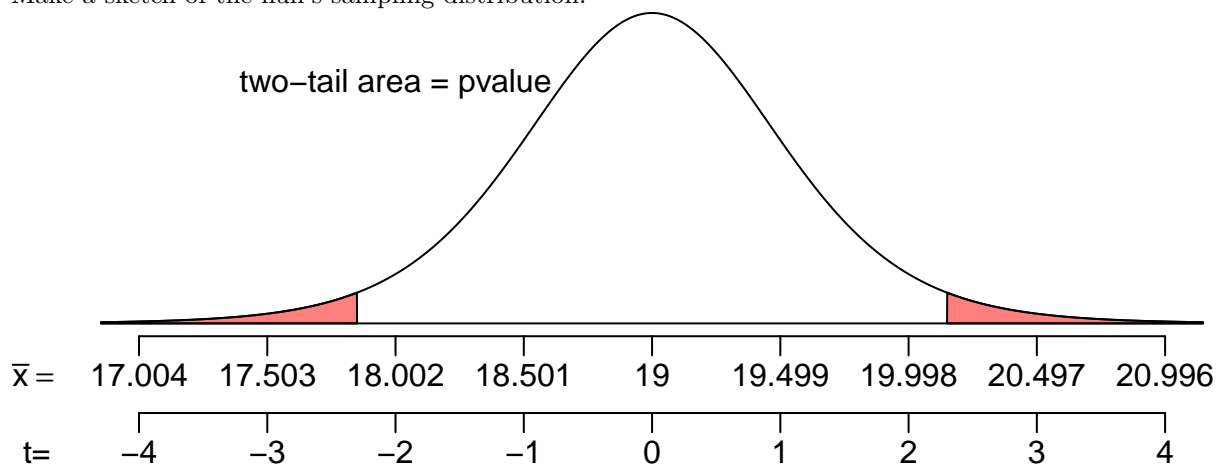
Determine the degrees of freedom.

$$df = 10 - 1 = 9$$

Find the standard error.

$$\sigma_{\bar{x}} = \frac{s}{\sqrt{n}} = \frac{1.578}{\sqrt{10}} = 0.499$$

Make a sketch of the null's sampling distribution.



Find the t score.

$$t = \frac{\bar{x} - \mu_0}{\sigma_{\bar{x}}} = \frac{20.15 - 19}{0.499} = 2.3$$

Find the p -value.

$$p\text{-value} = P(|T| > 2.3)$$

We can't get an exact value with our table, but we can determine an interval that contains the p -value. (Look at row with $df = 9$.)

$$P(|T| > 2.4) = 0.04$$

$$P(|T| > 2.26) = 0.05$$

Basically, because t is between 2.4 and 2.26, we know the p -value is between 0.04 and 0.05.

$$0.04 < p\text{-value} < 0.05$$

Compare the p -value and the significance level ($\alpha = 0.05$).

$$p\text{-value} < \alpha$$

Yes, we reject the null hypothesis.

Answerlist

- $0.04 < p\text{-value} < 0.05$
- Yes, we reject the null hypothesis.

Meta-information

extype: num exsolution: 0.047 exname: binomial exact extol: 0.01