UNIT 10 .- PARAMETRIC TESTS.

UNIT 10. GOALS

- Solve statistical testing problems for the mean, proportion and variance.

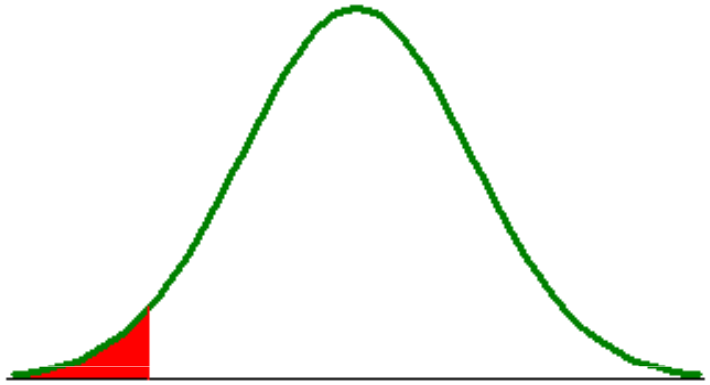
One-tailed test for the mean

$$H_0 : \mu \geq \mu_0 \qquad H_1 : \mu < \mu_0$$

•P-VALUE APPROACH

- **Obtain the test statistic** $d^*_{\bar{x}}$
- **Obtain the p-value**

$$p = P\left(d_{\bar{x}} < d^*_{\bar{x}} / H_0\right)$$



If the p-value is small, then the null hypothesis is rejected

Two-tailed test for the mean

$$H_0 : \mu = \mu_0 \qquad H_1 : \mu \neq \mu_0$$

•P-VALUE APPROACH

- **Obtain the test statistic** $d^*_{\bar{x}}$
- **Obtain the p-value**

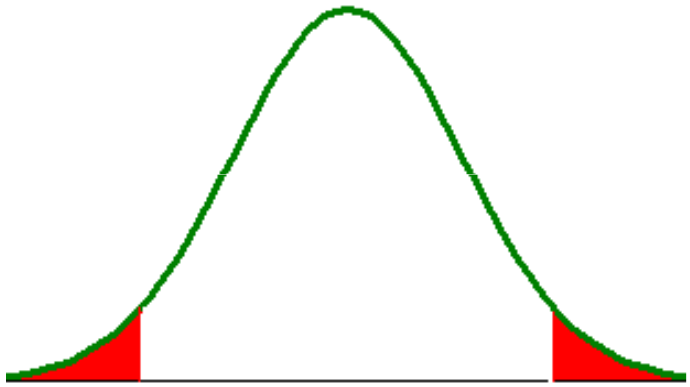
$$p = P\left(\left|d_{\bar{x}}\right| > \left|d^*_{\bar{x}}\right| / H_0\right)$$

N(0,1)

u Normal population, σ is known
u Unknown distribution but σ is known and n is large

t_{n-1}

u Normal population, σ is unknown



If the p-value is small, then the null hypothesis is rejected

Two-tailed test for the proportion

$$H_0 : p = p_0 \qquad H_1 : p \neq p_0$$

- **P-VALUE APPROACH**
- **Obtain the test statistic d***

$$d_{\hat{p}} = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} \approx N(0,1) \Rightarrow d_{\hat{p}}/_{H_0} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \approx N(0,1)$$

- **n is large**

- **Obtain the p-value**

$$p = P\left(\left|d_{\hat{p}}\right| > \left|d^*_{\hat{p}}\right| / H_0\right)$$

If the p-value is small, then the null hypothesis is rejected

Two-tailed test for the variance

$$H_0 : \sigma^2 \geq \sigma_0^2 \qquad H_1 : \sigma^2 < \sigma_0^2$$

- **P-VALUE APPROACH**

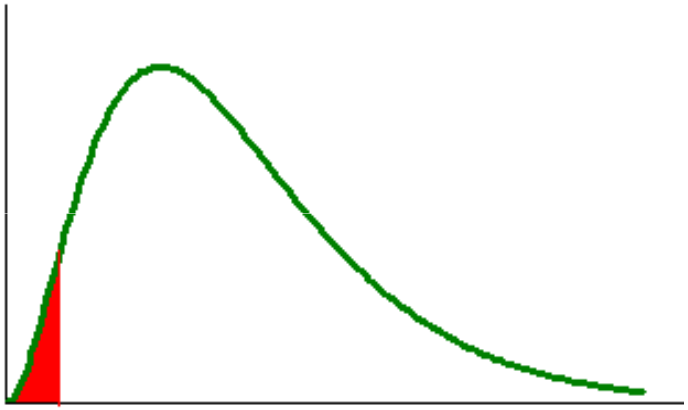
- **Obtain the test statistic** $d^*_{S^2}$

- **Obtain the p-value**

$$p = P\left(d_{S^2} < d^*_{S^2} / H_0\right)$$

χ^2_{n-1}

u Normal population

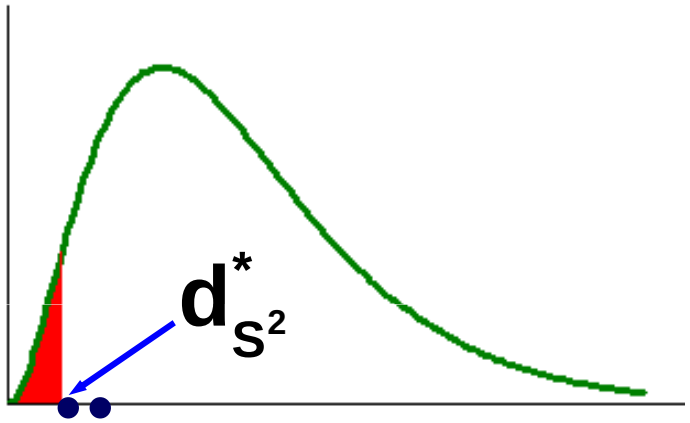


If the p-value is small, then the null hypothesis is rejected

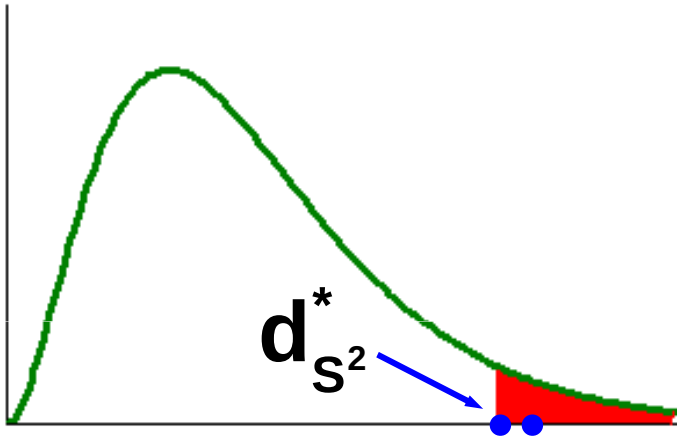
Two-tailed test for the variance

$$H_0 : \sigma^2 = \sigma_0^2 \quad H_1 : \sigma^2 \neq \sigma_0^2$$

- **P-VALUE APPROACH**
  - **Obtain the test statistic d***
  - **Obtain the p-value**



$$p = 2P\left(d_{S^2} < d^*_{S^2} / H_0\right)$$



$$p = 2P\left(d_{S^2} > d^*_{S^2} / H_0\right)$$

If the p-value is small, then the null hypothesis is rejected