CONFIDENCE INTERVAL AND HYPOTHESIS TEST

Confidence Intervals and Hypothesis Test

A confidence interval with confidence level of $(\mathbf{1} - \boldsymbol{\alpha})$

can lead to the **same type of conclusion** as

a two-sided hypothesis test with significance level of $\boldsymbol{\alpha}$

- **Reject** H_0 if the null value is **not captured** by the confidence interval
- **Do not reject** H_0 if the null value is **captured** by the confidence interval

Confidence Level $(1 - \alpha)$	Alternative Hypothesis	Significance Level (α)
90%	Two-Sided ≠	10%
95%	Two-Sided ≠	5%
99%	Two-Sided ≠	1%

Example: Death Penalty

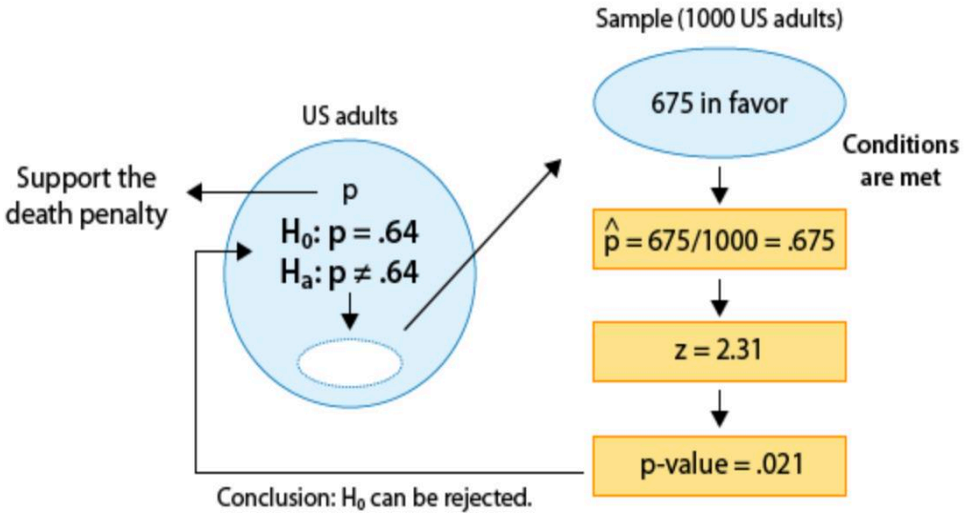
In 2003 a poll estimated that 64% of U.S. adults support the death penalty for a person convicted of murder. In a more recent poll, 675 out of 1,000 U.S. adults chosen at random were in favor of the death penalty for convicted murderers.

Do the results of this poll provide evidence that the proportion of U.S. adults who support the death penalty for convicted murderers (p) changed between 2003 and the later poll?

1. Conduct a hypothesis test with a significance level of 0.05.
2. Construct a 95% confidence interval for the proportion of Americans who support the death penalty.
3. Explain how your confidence interval supports the conclusion of your hypothesis test.

Example: Death Penalty

1. Conduct a hypothesis Test

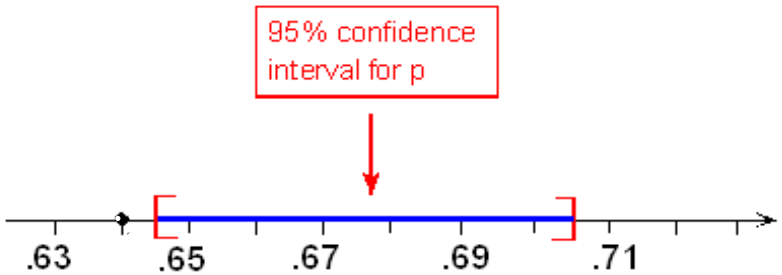


Example: Death Penalty

2. Construct a 95% Confidence Interval

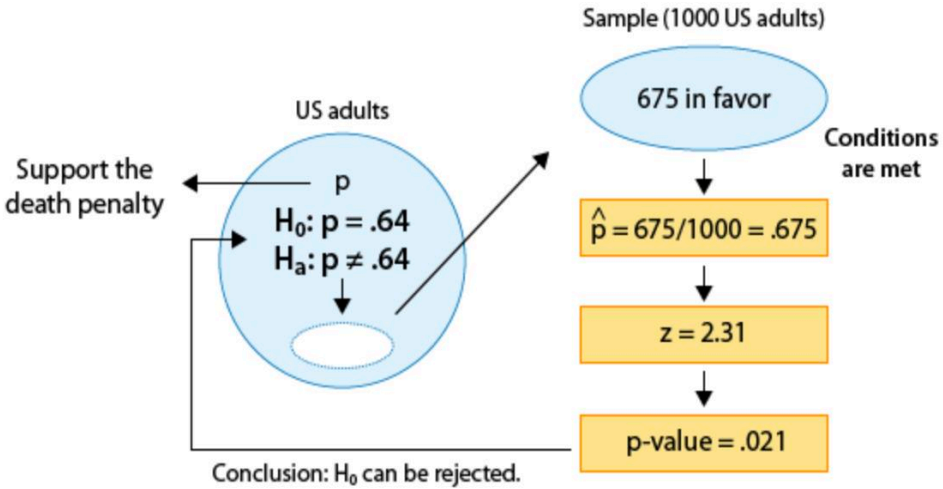
Conditions are met

$$0.675 \pm 1.96 \times \sqrt{\frac{0.675(1-0.675)}{1000}}$$
$$= 0.675 \pm 0.029$$
$$= (0.646, 0.704)$$



Example: Death Penalty

Hypothesis Test



95% Confidence Interval

$$0.675 \pm 1.96 \times \sqrt{\frac{0.675(1-0.675)}{1000}}$$
$$= 0.675 \pm 0.029$$
$$= (0.646, 0.704)$$