

Stat 101 – Lecture 29

More on Testing

- 500 randomly selected U.S. adults were asked the question: “Would you be willing to pay much higher taxes in order to protect the environment?”
- 216 answered yes

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More on Testing

- Is this convincing evidence that the proportion of all U.S. adults who are willing to pay higher taxes is different from 50%?

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Test of Hypothesis

- Step 1: State your null and alternative hypotheses.
 - $H_0: p = 0.50$
 - $H_A: p \neq 0.50$

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Test of Hypothesis

- Step 2: Check conditions
 - Random sampling conditionThe 500 adults were selected at random from all adults in the U.S.

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Test of Hypothesis

- Step 2: Check conditions
 - 10% conditionThere are over 100 million adults in the U.S. so 500 is less than 10% of the population.

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Test of Hypothesis

- Step 2: Check conditions
 - Success/Failure condition
$$np = 500(0.50) = 250$$
$$n(1 - p) = 500(1 - 0.50) = 250$$
Both are greater than 10.

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Test of Hypothesis

- Step 3: Calculate the test statistic value and convert it into a P-value.

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.432 - 0.5}{\sqrt{\frac{0.5(0.5)}{500}}}$$

$$z = \frac{-0.068}{0.0224} = -3.04$$

$$P\text{-value} = 2(0.0012) = 0.0024$$

Test of Hypothesis

- Step 4: Use the P-value to reach a decision.
 - The P-value is small therefore we should reject H_0

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Test of Hypothesis

- Step 5: State your conclusion in the context of the problem.
 - There is convincing evidence that the proportion of the population willing to pay more taxes is different from 50%.

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