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

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%?

Test of Hypothesis

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

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

Test of Hypothesis

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

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.
Test of Hypothesis

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

\[ z = \frac{\hat{p} - p_a}{\sqrt{\frac{p_a(1 - p_a)}{n}}} = \frac{0.432 - 0.5}{\sqrt{\frac{0.5(0.5)}{500}}} \]

\[ z = \frac{-0.068}{0.0224} = -3.04 \]

\[ P - value = 2(0.0012) = 0.0024 \]

Test of Hypothesis

• Step 4: Use the P-value to reach a decision.

–The P-value is small therefore we should reject \( H_0 \)

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%.