

# Stat 101L: Lecture 29

## Interpretation

- \* Getting a value of the sample proportion of 0.12 is consistent with random sampling from a population with population proportion  $p = 0.10$ .
- \* This sample result does not contradict the null hypothesis. The P-value is not small, therefore fail to reject  $H_0$ .

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## Interpretation

- \* Even though the sample proportion, 0.12, is larger than the hypothesized population proportion, 0.10, it is not large enough for us to believe that the population proportion is greater than 0.10.
- \* There is not convincing evidence.

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## Conclusion

- \* Based on this sample, the law firm should not pursue the class action lawsuit because the population proportion of defective cars could be only 10%.

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## Test of Hypothesis

\*Step 1: State your null and alternative hypotheses.

–  $H_0: p = p_0$

–  $H_A: p > p_0$

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## Test of Hypothesis

\*Step 2: Check conditions

– Independence

– Random sampling condition

– 10% condition

– Success/Failure condition

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## Test of Hypothesis

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

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

– Use Table Z.

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## Test of Hypothesis

- \*Step 4: Use the P-value to reach a decision.
  - If the P-value is small, then reject  $H_0$ .
  - If the P-value is not small, then fail to reject  $H_0$ .

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## Test of Hypothesis

- \*Step 5: State your conclusion in the context of the problem.
  - What does rejecting, or failing to reject,  $H_0$  mean in the context of the problem.

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## Alternatives

- \* $H_0: p = p_0$ 
  - $H_A: p < p_0$ , P-value =  $\Pr < z$
  - $H_A: p > p_0$ , P-value =  $\Pr > z$
  - $H_A: p \neq p_0$ , P-value =  $\Pr > |z|$

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## Another Example

- \* According to the U.S. census, Story County has 9.7% of its population classified as non-white.
- \* Of 120 people called for jury duty in Story County only 3 are non-white. Is this convincing evidence of under-representation of non-whites?

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## Another Example

- \* Step 1: State your null and alternative hypotheses.
  - $H_0: p = 0.097$
  - $H_A: p < 0.097$
  - $p$  is the proportion of non-whites among all people in the jury pool for Story County.

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## Test of Hypothesis

- \* Step 2: Check conditions
  - Independence
  - Random sampling condition
  - 10% condition
  - Success/Failure condition

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## Test of Hypothesis

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

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.025 - 0.097}{\sqrt{\frac{0.097(1-0.097)}{120}}}$$

$$z = \frac{-0.072}{0.027} = -2.67$$

P - value = 0.0038

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## Test of Hypothesis

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

–Because the P-value is small, we should reject  $H_0$

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## Test of Hypothesis

\*Step 5: State your conclusion in the context of the problem.

–This is convincing evidence that non-whites are under-represented in the jury pool.

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