

Stat 101 – Lecture 26

Inference

- Confidence Interval for p

$$\hat{p} - z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \text{ to } \hat{p} + z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

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Confidence Interval

- Plausible values for the unknown population proportion, p .
- We have confidence in the process that produced this interval.

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Confidence Interval

- The population proportion, p , could be any of the values in the interval.
- Values outside the interval are not plausible values for p .

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Inference: Hypothesis Test

- Propose a value for the population proportion, p .
- Does the sample data support this value?

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Example

- A law firm will represent people in a class action lawsuit against a car manufacturer only if it is sure that more than 10% of the cars have a particular defect.

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Example

- Population: All cars of a particular make and model.
- Parameter: Proportion of all the cars of this make and model that have a particular defect, p .

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Example

- Null Hypothesis
– $H_0: p = 0.10$
- Alternative Hypothesis
– $H_A: p > 0.10$

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Example

- The law firm randomly selects 100 people who own the particular make and model of the car and finds out that 12 of them have cars that have the defect.
- Is this sufficient evidence for the law firm to proceed with the class action law suit?

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Example

- How likely is it to get a sample proportion as extreme as the one we observe when taking a random sample of 100 from a population with $p = 0.10$?

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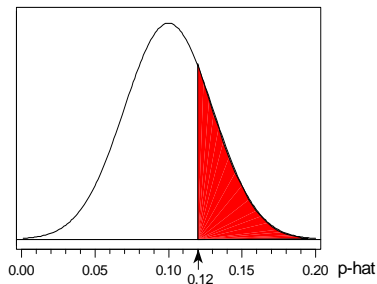
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Example

- Sampling distribution of \hat{p}
 - Shape approximately normal because 10% condition and success/failure condition satisfied.
 - Mean: $p = 0.10$
 - Standard Deviation: $\sqrt{\frac{0.10(0.90)}{100}} = 0.03$

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Draw a Picture



Standardize

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$
$$z = \frac{0.12 - 0.10}{\sqrt{\frac{0.10(0.90)}{100}}} = \frac{0.02}{0.03} = 0.67$$

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