Stat 101L: Lecture 28

Inference

- Confidence Interval for p

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

1

Confidence Interval

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

2

Inference – Using C.I.

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

3

Stat 101L: Lecture 28

Inference – Hypothesis Test

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

4

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.

5

Example

- Population: Cars of a particular make and model.
- Parameter: Proportion of this make and model of car that have a particular defect.

6

Stat 101L: Lecture 28

Example

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

7

Example

- The law firm contacts 100 car owners at random 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?

8

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 $p = 0.10$?

9

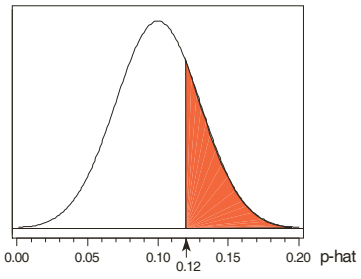
Stat 101L: Lecture 28

Example

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

10

Draw a Picture



Standardize

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

$$z = \frac{0.12 - 0.10}{\sqrt{\frac{0.10(0.90)}{100}}} = \frac{0.02}{0.03} = 0.67$$

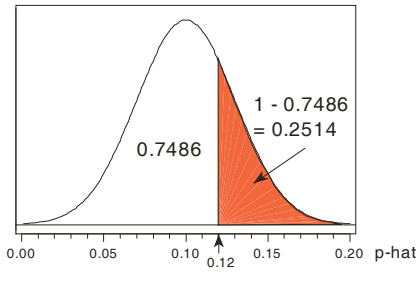
12

Stat 101L: Lecture 28

Use Table Z

z	0.05	0.06	0.07
0.05			
0.06	→		**0.7486**
0.07			

13



14

Interpretation

- Getting a sample proportion of 0.12 or more will happen about 25% (P-value = 0.25) of the time when taking a random sample of 100 from a population whose population proportion is $p = 0.10$.

15