Stat 101 – Lecture 30

Thinking about the P-value

- The P-value is the probability of getting a value of the sample proportion as, or more, extreme as the one we actually observed, *given* that the null hypothesis is true.

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Thinking about the P-value

- The P-value is *NOT* the probability that the null hypothesis is true.
- The smaller the P-value the more comfortable we feel about rejecting the null hypothesis.

2

What is a small P-value?

- A small P-value is one that corresponds to a rare occurrence.
- What is a “rare occurrence”?
- We can define what is a “rare occurrence” by setting a level of significance or “alpha level”.

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"Rare Occurrence"

- Many use the rule of thumb that a "rare occurrence" is anything with a probability less than 0.05.
- A small P-value would then be any P-value less than 0.05.

"Rare Occurrence"

- We can define a "rare occurrence" as anything with a probability less than, say, 0.01.
- If the P-value is less than 0.01, then the result is statistically significant at the 0.01 level.

"Rare Occurrence"

- By setting the level of significance at a smaller value, e.g. 0.01, we need more convincing sample evidence before we can reject a null hypothesis.

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Significance

- Statistical significance indicates a result that cannot be explained by the variation due to random sampling.
- Statistical significance is not necessarily practical significance.

CIs and Tests

- A 95% confidence interval for the proportion of the U.S. population willing to pay more taxes to protect the environment is

  38.8% to 47.6%.

CIs and Tests

- 50% is not in the confidence interval, therefore, 50% is not a plausible value for the population proportion.
- This agrees with the decision to reject the null hypothesis that p=0.50.