Handout 1.2: Introduction to Hypothesis Testing

Dr. Bean - Stat 5100

Determine whether or not the following statements are true or false:

- **The p-value is the probability that the null hypothesis is true. (FALSE)**

- **We reject a null hypothesis when the p-value is small. (TRUE)**

- **If the p-value is very small, it is not possible that the null hypothesis is true. (FALSE)**

- **The difference between the sample mean and the population mean is all that matters in the test statistic. (FALSE)**

What is the different between a practical difference and a "significant" difference?

A practical difference is one in which the magnitude of the difference is large enough to matter in the context of the problem. (Example: a new drug lowers cholesterol, on average by three points. Such a reduction is too small to justify taking the drug, regardless of the statistical significance.

A practical difference is not always significant, and a significant difference is not always practical.

When sample sizes are LARGE, nearly every difference is flagged as significant, even if the actual difference between groups is inconsequential.

Can you think of an example when our primary motive for creating a model is to create accurate predictions? How about an example where the primary motive is determining the significance of the coefficients?

Accuracy: Predicting the market value of a house given square footage, lot size, etc.

Significance: Determining if there is a statistically significant gender bias in pay, after accounting for other demographic factors.