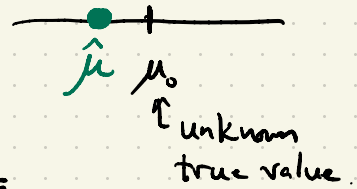The 3 big themes for Part 3 of the course.

1. Point Estimation

   For model parameters
   of interest, give our
   best <u>estimate</u> from the data.

   $\hat{\mu}$ μ_0
   $\uparrow$ unknown true value.

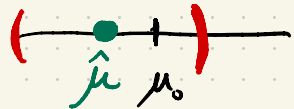   Examples: Mean $\hat{\mu}$, Population Proportion $\hat{p}$,
   Difference of Means $\hat{d}$,
   Standard Deviation $\hat{\sigma}$
   Regression slope b_1 and intercept b_0

2. Interval Estimation
   (Confidence Intervals)

   $\hat{\mu}$ μ_0

   For a given point estimate
   provide an interval that will include
   the true value a desired fraction of the time.

   "With 95% confidence, the total population
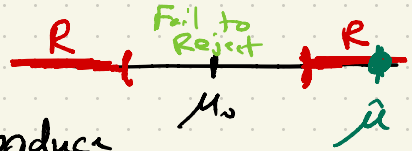   mean is between 42.3 and 43.8."

3. Hypothesis Testing / p-values

We state an effect of interest and propose a __null model__ in which the effect does not exist. We establish a rejection region of values the null model is unlikely to produce. If the point estimate falls in the rejection region, we state that

"We reject the null hypothesis that the effect does not exist."

The p-value is the probability that the null model can produce the point estimate value or any value more extreme.

p-values are an essential and universal part of scientific communication.

(for better or for worse)