# 5. Testing

Q Under what conditions will the sampling distribution of $\hat{\bar{Y}}_1 - \hat{\bar{Y}}_0$ be

A) Normal?

B) t?

What is the actual distribution of $\hat{Y}_1 - \hat{Y}_0$?

↳ See code

What is the actual distribution of $\hat{\hat{Y}}_1 - \hat{\hat{Y}}_0$?

↳ See code

What does this distribution represent?

# Inference

**Key Question:** Is it possible our estimate is due to chance?

## Steps of a Hypothesis Test

1) Choose an alpha-level ($\alpha$) / decision boundary.
   - ↳ $0 \leq \alpha \leq 1$
   - ↳ $\alpha \geq P_{H_0}(\text{Reject } H_0)$ ← Type I error
2) Define a random data generating process.
3) Determine meaningful null hypothesis, $H_0$, and alt., $H_A$.
4) Determine a test statistic, T (which is a RV).
5) Derive / approximate distribution of T.
6) Decide whether or not to reject null, $H_0$.

# Nonparametric Method (Permutation Test)

1)

2)

3)

# Nonparametric Method (Permutation Test)

1) $\alpha = .05$

2) $Y_i(1), Y_i(0)$ are fixed. $Y_i$ is random only because $D_i$ is random.

3) $H_0$: "Previous question does not affect response"
   ↳ $H_0$: $Y_i(1) = Y_i(0)$ for all $i$ ← this allows us to populate a full schedule of outcomes.

# This Weekend

- Finish + submit Lab 1
- Work on PS 1.