Hypothesis Testing Review

What is it good for?

Hypothesis test have been shown to be valuable contributors to science ($p < .05$) but are sometimes abused ($p < .05$).

- Used to assess the degree to which data is consistent with a particular model.
- The most widely used tool in statistical inference.

Step 1

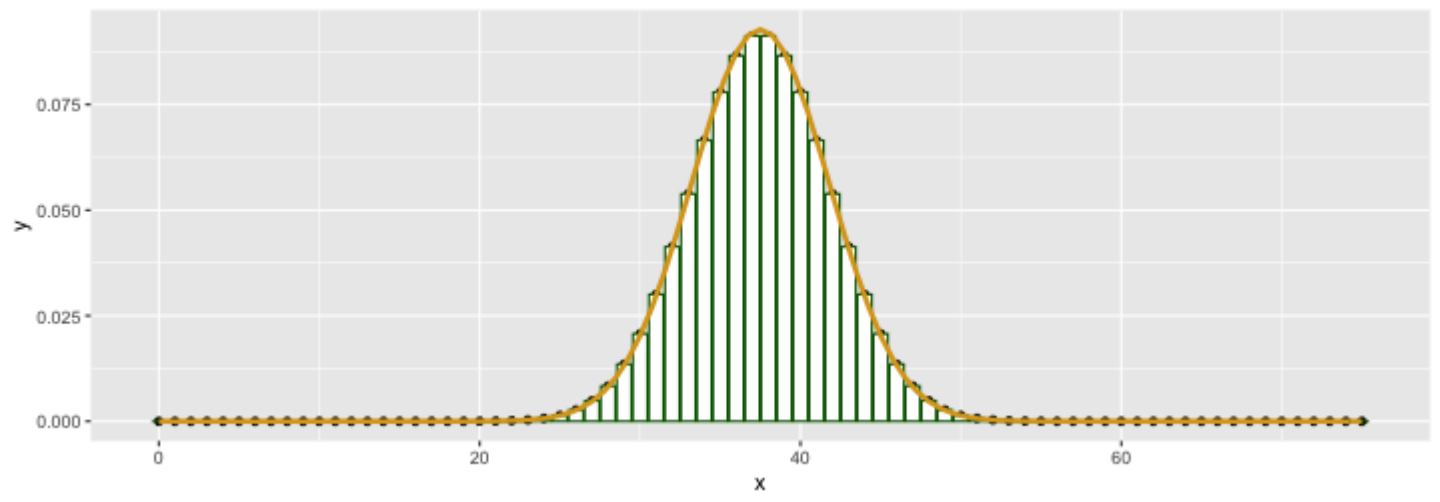
Lay out your model(s).

H_0: null model, business as usual
H_A: alternative model, business not as usual

- Hypotheses are statments about the TRUE STATE of the world and should involve *parameters*, not *statistics*.
- Hypotheses should suggest a *test statistic* that has some bearing on the claim.
- Always use two-tailed tests.

Step 2

Contruct the appropriate null distribution.



1. Permutation (when `null = "independence"`)
2. Simulation (when `null = "point"`)
3. Exact Probability Theory (when you're lucky)
4. Normal Approximation (when the CLT applies)

Step 3

Calculate a measure of consistency between the observed test statistic (the data) and the null distribution (i.e., a p-value).

- If your observed test stat is in the tails > low p-val > data is inconsistent with null hypothesis > "reject null hypothesis".
- If your observed test stat is in the body > high p-val > data is consistent with the null hypothesis > "fail to reject the null hypothesis".

What can go wrong?