WS #19 - Rejecting Null Hypotheses

Math 150, Jo Hardin

Monday, April 21, 2025

Your Name: _____

Names of people you worked with: _____

Have you ever had lunch with a professor? If so, who? If not, you should!

Task: Let's say you run 45 separate null and independent tests (at a 0.05 level of significance). That is, for each test the null hypothesis is true. And the 45 tests themselves are completely independent.

1. How many of the tests would you expect to be significant?
2. What is the probability that, out of the 45 null hypotheses, you reject

Solution:

1. We know that we reject 5% of null tests, so we'd expect to reject $45 \cdot 0.05 = 2.25$ of the tests.
2.

$$\begin{aligned} P(\text{rejecting at least one hypothesis}) &= P(\text{at least one type I error}) \\ &= 1 - P(\text{no type I errors}) \\ &= 1 - (1 - 0.05)^{45} \\ &= 0.9 \end{aligned}$$