Week 13 - Two Sample Hypothesis Tests

Key Concepts

- Perform studies to compare two groups and check if they behave differently.
- Example: applying a treatment to one group while another is left untreated.

Matched Pairs

- The first type of 2 sample hypothesis test: matched pairs. (data of both samples is dependent)
- Example: clinical drug trial for a blood pressure medication. Medication is given to a group of people and we measure blood pressure before and after the treatment.
- Treating before and after as two samples and compare them (but we can match the entries to the same people!)

Matched Pairs

Since data is matching: we take the difference from before and after, and do a hypothesis test on the difference being equal to zero.

$$H_0 : \mu_d = 0$$

$$H_a : \mu_d \neq 0$$

Matched Pairs

- Two groups where we cannot match the rows to one another.
- Example: Comparing the effect of a certain medication on a sample of men and a sample of women.
- Another Example: A/B testing on a website / app

Assumptions for Independent Samples

1. Samples are actually independent (for example groups are not selected from the same households etc).

2. Samples were drawn at random from a normally distributed population.

$$H_0 : \mu_1 = \mu_2$$

$$H_a : \mu_1 \neq \mu_2$$

Slightly different tested based on a third assumption: do we assume variances of our samples to be equal?