Outline

1. Situation: a categorical variable with $I$ levels and a quantitative variable
   (a) Simple random samples from each of $I$ populations
   (b) Simple random sample from one population divided into $I$ groups based on a categorical variable
   (c) Randomized comparative experiment with $I$ treatments

2. Examples:
   (a) Cuckoos eggs.
   (b) Chicken feed.
   (c) Reading instruction.

3. Research question: is there a difference in the population means?
   $H_0$: $\mu_1 = \mu_2 = \cdots = \mu_I$
   $H_a$: not all of the $\mu_i$ are equal

4. Possible solution: do all two-sample $t$ tests.
   (a) multiple comparisons
   (b) post hoc analysis

5. ANOVA (analysis of variance)
   (a) Assumption: the $i^{th}$ group has a normal distribution mean $\mu_i$ and standard deviation $\sigma_i$.
   (b) Statistic: $F$ – the bigger $F$ is, the greater the evidence against $H_0$. 

![ANOVA](https://example.com/ANOVA.png)
Reading Quiz: Rubber Bands

21 rubber bands were divided into two groups. One group was placed in hot water for 4 minutes while the other was left at room temperature. They were each then stretched by a 1.35 km weight and the amount of stretch in mm was recorded. The data from Crunchit is below.

The hot water group is labeled H and the room temperature group is A. A hypothesis test is performed and the results are below.

1. What are the parameters $\mu_1$ and $\mu_2$?

2. What is the null hypothesis in terms of $\mu_1$ and $\mu_2$?

3. Write a good sentence that gives a conclusion from this hypothesis test.