Outline

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

2. Hypothesis tests:

   \[ H_0: \mu_1 = \mu_2 \]
   \[ H_a: \mu_1 > \mu_2 \]

   \[ H_0: \mu_1 = \mu_2 \]
   \[ H_a: \mu_1 < \mu_2 \]

   \[ H_0: \mu_1 = \mu_2 \]
   \[ H_a: \mu_1 \neq \mu_2 \]

3. If \( H_0 \) is true, then

   \[ \frac{\bar{x}_1 - \bar{x}_2}{SE} \]  
   where \[ SE = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \]

   has a \( t \)-distribution.

   Example: Do male and female Calvin students have different body temperatures?

4. Hemoglobin levels of elite Australian athletes.

5. Resolving random dot stereograms.
