Experiment Plan

**Research question**

Is there a difference in the ripening of bananas over the course of four days based on the type of bag that they are placed in?

**Treatments**

Stored without a bag (control), stored in a paper bag, stored in a Ziploc gallon sized bag

**Experimental units**

30 bananas purchased from Trader Joes

**Experimental design**

*Matching*: Match bananas into triplets prior to the experiment based on mass (i.e. heaviest three bananas matched together, next three heaviest, etc.)

*Randomization*: Within each matched triplet, randomize the assignment of each treatment group, with all assignments equally likely.

*Measurement*: All measurements will be done by asking the same third-party participant to evaluate the ripeness of bananas based on photographs, as compared to a provided color scale. The third-party will be blinded and not made aware of which treatment group each banana corresponds to. Measurements will be made pre- and post-experiment, with the metric of interest being the change in ripeness (i.e. post-experiment minus pre-experiment measurements).

*Quality Control*: All bananas will be placed in a similar environment (a countertop in an apartment) and will differ only by their treatment assignment. We will control for pre-experiment ripeness by only purchasing bananas that seem similarly ripe relative to one another.

**Statistical inference**

*Hypothesis testing*: To test our research question, we will perform three pairwise comparison hypothesis tests, testing a sharp null hypothesis of no effect for (i) control vs paper bag, (ii) control vs plastic bag, and (iii) paper bag vs plastic bag. To do so, we will perform a permutation test, using either (a) a difference-in-means, (b) a difference-in-medians, or (c) difference-in-ranks test statistic depending on the skewness of our data. To correct for testing multiple hypotheses simultaneously, we will perform a Bonferroni correction before assessing significance at the α=0.05 level.