LO 1. Define analysis of variance (ANOVA) as a statistical inference method that is used to determine - by simultaneously considering many groups at once - if the variability in the sample means is so large that it seems unlikely to be from chance alone.

LO 2. Recognize that the null hypothesis in ANOVA sets all means equal to each other, and the alternative hypothesis suggest that at least one mean is different.

$H_0: \mu_1 = \mu_2 = \cdots = \mu_k$

H_A: At least one mean is different

LO 3. List the conditions necessary for performing ANOVA

1. the observations should be independent within and across groups
2. the data within each group are nearly normal
3. the variability across the groups is about equal and use graphical diagnostics to check if these conditions are met.

LO 4. Recognize that the test statistic for ANOVA, the F statistic, is calculated as the ratio of the mean square between groups (MSG, variability between groups) and mean square error (MSE, variability within errors). Also recognize that the F statistic has a right skewed distribution with two different measures of degrees of freedom: one for the numerator ($df_G = k - 1$, where k is the number of groups) and one for the denominator ($df_E = n - k$, where n is the total sample size).

- Note that you won't be expected to calculate MSG or MSE from the raw data, but you should have a conceptual understanding of how they're calculated and what they measure.

LO 5. Describe why calculation of the p-value for ANOVA is always "one sided".

LO 6. Describe why conducting many t-tests for differences between each pair of