Summarizing and visualizaing data

BIOL01104 Spring 2020, Dr. Spielman

This worksheet uses a dataset of information about olives collected from Italy. The data contains information about the fatty acid content for 572 olives from Northern Italy, Southern Italy, and Sardenia (a Mediterranean island off the coast of Italy). Answer questions about each plot with your table. **For all plots, identify the type of data (quantitative/numeric or categorical) on each axis. If numeric, identify if it is discrete or continuous**

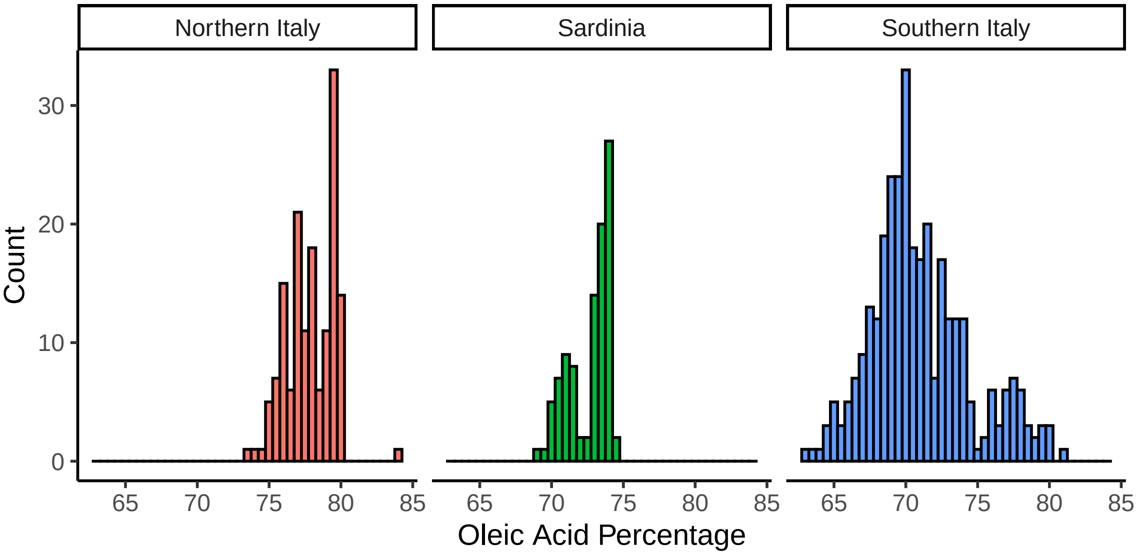
Histograms

The histograms below show the **distribution of oleic acid percentages** for olives collected from the three regions.

1. Describe the shape each distribution:
   - Are they unimodal or bimodal?
   - Roughly symmetric or assymetric?
   - Are there any outliers?
2. What is (roughly) the minimum, maximum, and mode for each distribution?
3. Rank the regions in terms of their *means*: Which region has the highest mean oleic acid percentage? The second highest? The lowest?
4. Rank the regions in terms of their *variation*: Which region has the most variation for oleic acid percentage? The second highest? The lowest? *Calculate each distribution's coefficient of variation (COV) to answer this question!* Note: the *actual means* and standard deviations are…

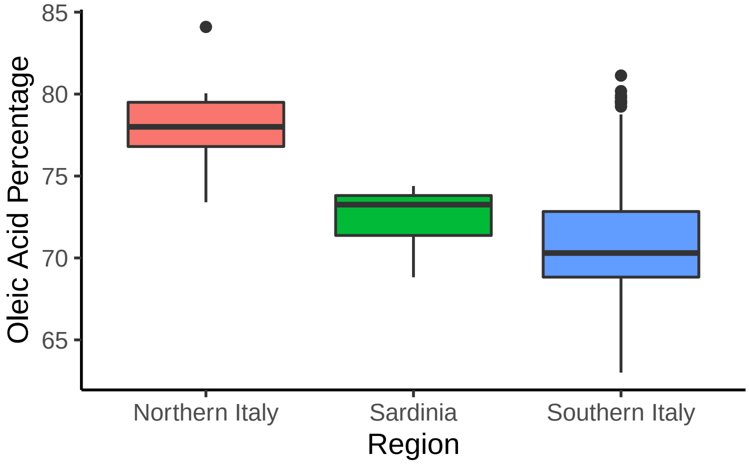
Region	Mean	Standard Deviation
Northern Italy	77.9	1.6
Sardenia	72.7	1.4
Southern Italy	71.0	3.5

5. Determine which distribution *most accurately reflects the TRUE POPULATION distribution of its regional olives.* To answer this question, you will need to calculate the *standard error*, which tells you how close the sample mean is to the population mean. Note: there are 151 olives from Northern Italy, 98 olives from Sardinia, and 323 olives from Southern Italy.

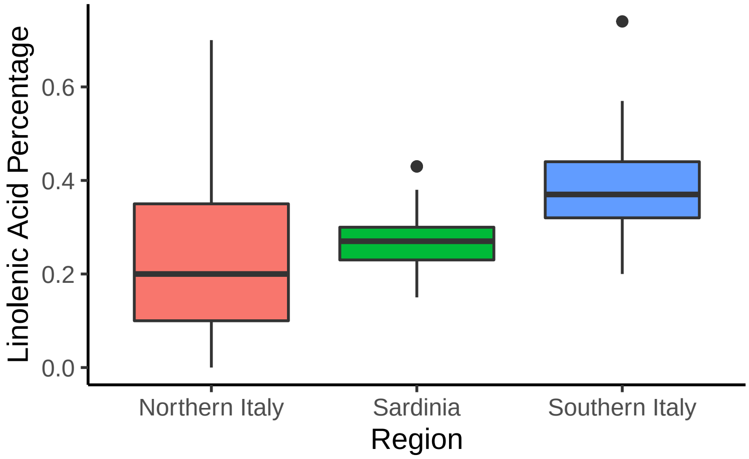


Boxplots

The boxplots below again shown the **distribution of oleic acid percentages** for olives collected from the three regions. Answer questions 1, 2, and 3 (although consider the *median* rather than mean!) from the Histogram section again, but using the boxplots are your guide. Were boxplots or histograms more informative for answering these questions?



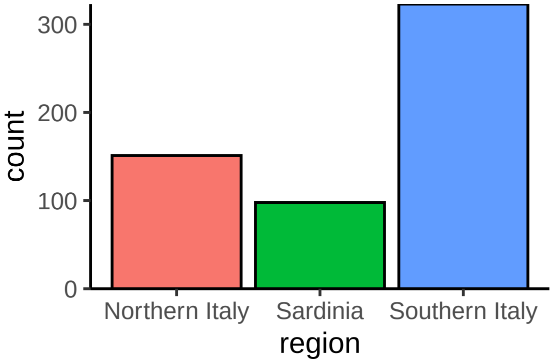
The boxplots below shown the **distribution of linolenic acid percentages** for olives collected from the three regions. Answer the same questions (mean, standard deviation). Then, compare the trends you observed for the previous boxplots of oleic acid to these linolenic acid boxplots. What are the similarities and differences between these two types of acids in olives?



Finally, draw by hand (with your table!) a *bar plot* showing the mean oleic acid percentage for each region (refer to Histogram question #4 for the actual values). Include error bars for *standard deviation* (draw roughly the entire error bar length to equal the standard deviation).

Barplots

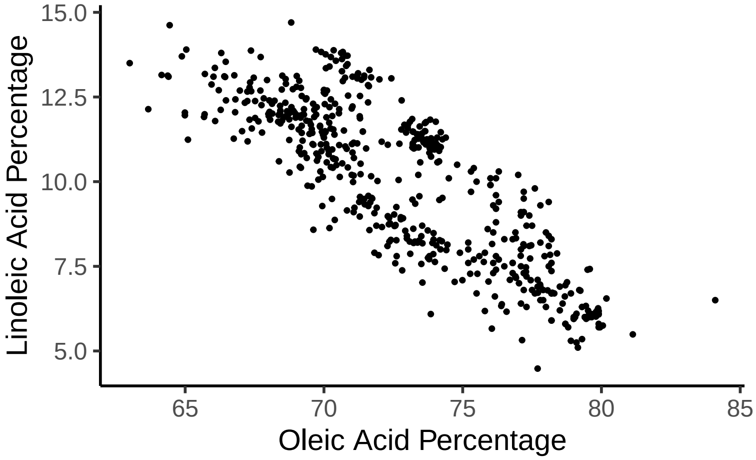
The barplot below shows the *number of olives* collected from each region. Roughly determine how many olives were collected from each region. What is the *mode* of the distribution of olive counts?



Scatterplots, Part 1

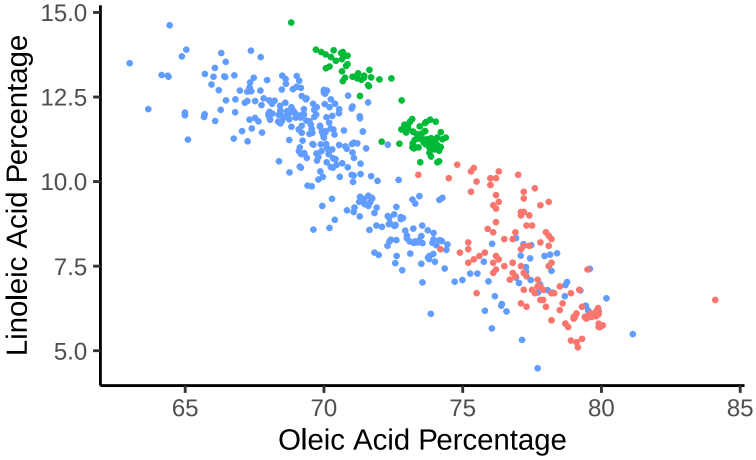
The scatterplot below shows the *relationship* between percentages of oleic aand linoleic acid in each olive. Thus, there are 572 points in this figure (1 point per olive).

Is there a strong, moderate or weak correlation? Is the correlation positive or negative? Draw a rough estimate of the line-of-best-fit for these points.



The scatterplot below is a modified version of the above scatterplot, where this time points are colored according to which region the olive comes from.

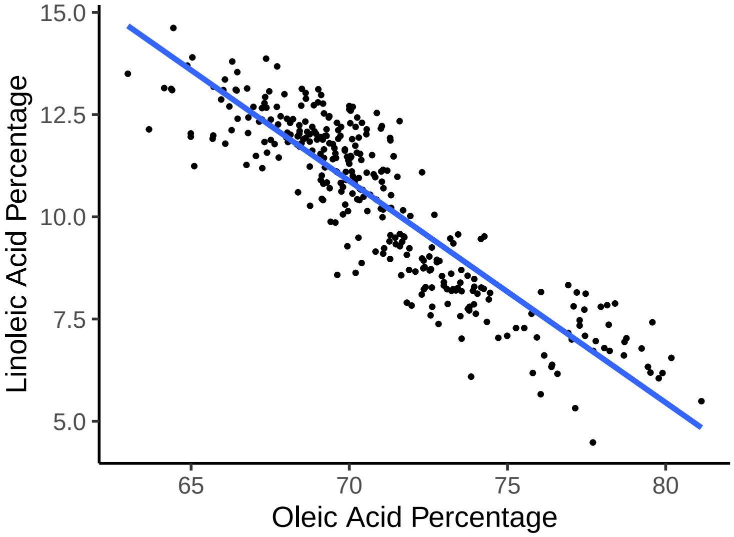
What differences and similarities do you observe among regions? Draw a rough estimate of the line-of-best-fit for each region SEPARATELY and compare their trends: Which region appears to have the highest correlation? The lowest? Are all correlations the same direction (positive or negative)?

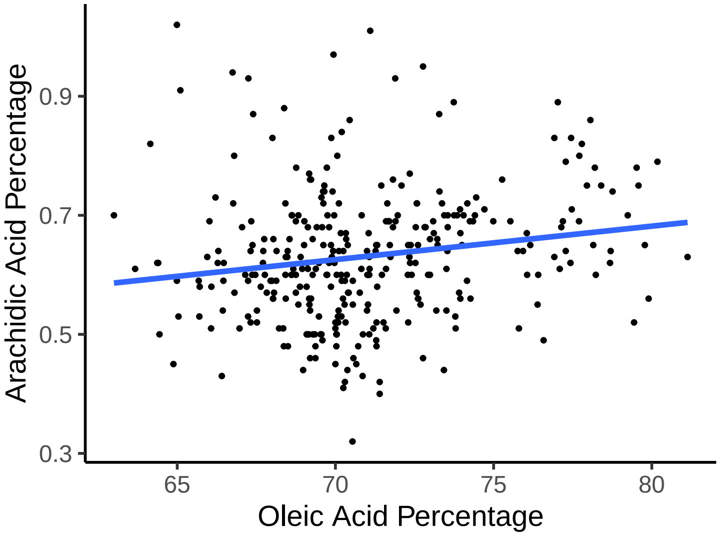


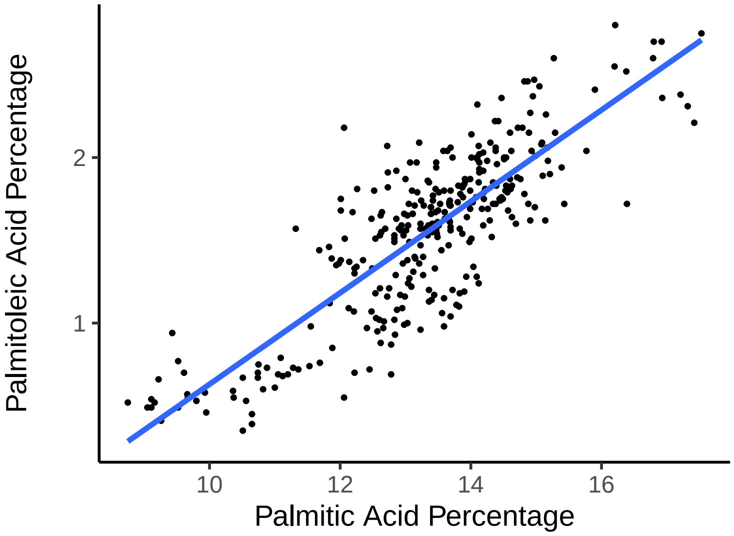
Scatterplots, part 2

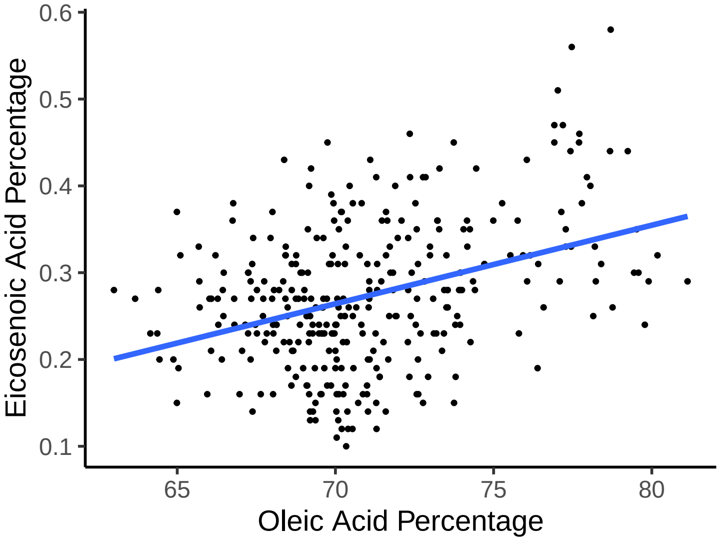
Below are four different scatterplots each with a *line of best fit* showing the overall relationship between X and Y variables. Each plot shows the relationship between two different types of fatty acids, for Southern Italy olives only.

Characterize each plot as having a strong, moderate or weak correlation, as well as whether the correlation is positive or negative.


Linoleic Acid Percentage
Oleic Acid Percentage


Arachidic Acid Percentage
Oleic Acid Percentage


Palmitoleic Acid Percentage
Palmitic Acid Percentage


Eicosenoic Acid Percentage
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