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# Lecture 11: Describing Relationships

## In-Class Activities

For all of these problems, we will use the `heart` dataset in the `MSMU` library to complete the following tasks:

1. **Quantitative vs Quantitative:** Look at the relationship between `Age` and `MaxHR`.
  - (a) Create a scatterplot with `Age` on the x-axis and `MaxHR` on the y-axis
  - (b) Add a line of best fit to the scatterplot
  - (c) Calculate the correlation between `Age` and `MaxHR`
  - (d) In a good sentence: describe the direction, form, strength, and any unusual features of the relationship
2. **Quantitative vs Categorical:** Look at how `Chol` changes across the different values of `ChestPain`.
  - (a) Calculate the number of observations, mean, median, and standard deviation of `Chol` for each `ChestPain` group
  - (b) Create a side-by-side boxplot of `Chol` for each `ChestPain` category
  - (c) Add the mean of each group as a point on the boxplot
  - (d) In a good sentence: describe how the distributions compare in terms of center, spread, and overlap
3. **Categorical vs Categorical:** Look at the relationship between `Sex` and `AHD`.
  - (a) Convert `Sex` to a categorical variable with labels such as “Male” and “Female”
  - (b) Determine the total number of observations in each combination of `Sex` and `AHD`
  - (c) Calculate the conditional proportions of `AHD` within each `Sex` group
  - (d) Create a segmented bar chart showing the relationship between `Sex` and `AHD`
  - (e) In a good sentence: state whether the variables appear to be associated