Week 8 Assignment

Estimated Time To Complete: 2 - 8 hrs

This week’s assignment is going to build off of last week's assignment

**Basic Plotting**

1. Visualize normal\_data using a histogram. Experiment with different numbers of bins (e.g., 10, 20, 50). Add a grid to the plot and adjust its style, such as using dashed lines.
2. Create a histogram of uniform\_data in a separate figure. Add a title and label the x-axis and y-axis. Customize the font size and color of the title and axis labels.

**Subplots and Multi-Panel Figures**

1. Visualize normal\_data and uniform\_data using two subplots within the same figure. Place one histogram above the other in a stacked layout. Add a shared x-axis label and y-axis label for the whole figure.
2. Visualize normal\_data and uniform\_data using two subplots arranged side by side. Ensure each subplot has a different style for its grid, such as adjusting transparency or line style.
3. Create a single figure with four subplots arranged in 2 rows and 2 columns. Assign one of the following visualizations to each subplot. Adjust the sizing between each plot to avoid overlap.
   * Histogram of normal\_data (top left)
   * Histogram of uniform\_data (top right)
   * Boxplot of the first 100 samples of normal\_data (bottom left)
   * Boxplot of the first 100 samples of uniform\_data (bottom right)
   * Bonus:

* For all boxplots, update the tick labels on the x axis with "Normal Data" and "Uniform Data".
* Add a shared y axis for the boxplots, and then for the histograms
* Add a shared x axis only for the histograms
* Add a single y label for the histograms
* Add a single y label for the boxplots
* Set the color of normal data in histogram and boxplot. Do the same with uniform data

**Customization and Advanced Axes Manipulation**

1. Visualize the first 100 samples of normal\_data and uniform\_data using boxplots on the same axes. Add individual data points on top of the boxplots. Use different marker shapes for normal\_data and uniform\_data and adjust their transparency for better visibility.
2. Explore jittering the data points in the previous boxplots to better separate overlapping points.
3. Add horizontal and vertical lines at specific locations on the boxplot:
   * Add a horizontal line at the median of the x-data.
   * Add a vertical line at the median of the y-data.

**Scatter Plots and Lines**

1. Using a scatter plot, visualize linear data (e.g., generate x as an array from 0 to 99, Create y as a linear function of x with added noise.).
   1. Add a line of best fit to the scatter plot.
2. Customize the scatter plot by changing the marker size, marker color, and layering order of the points and lines. Add a legend to differentiate the data and the line.