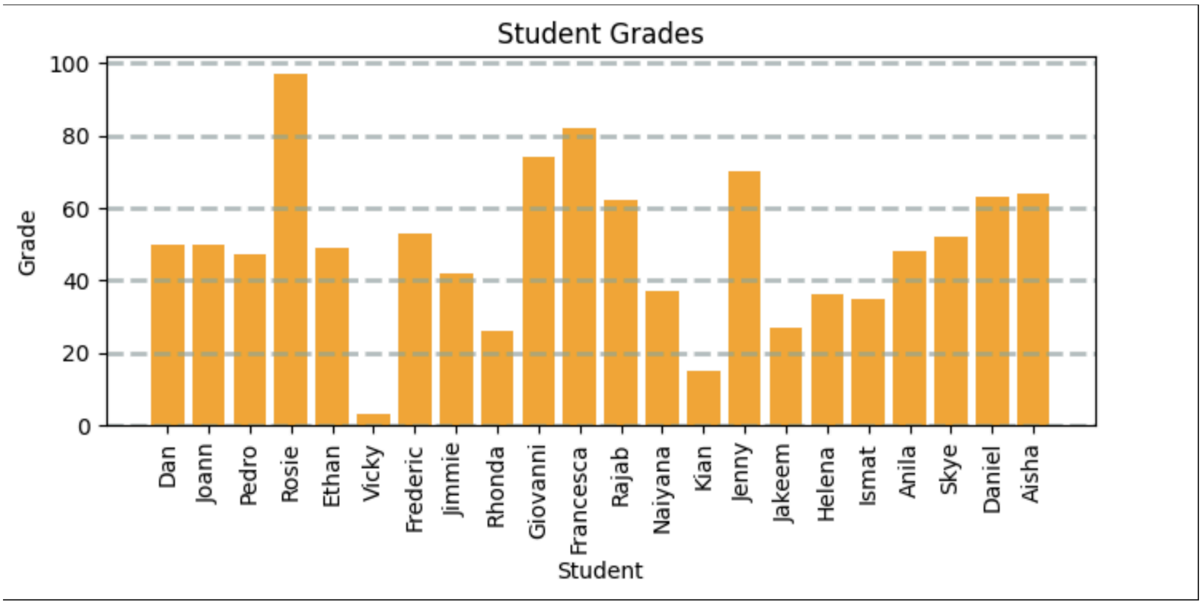
Matplotlib

(AI notes)

// Bar chart that shows the grade of each student:

```
from matplotlib import pyplot as plt

# Create a Figure
fig = plt.figure(figsize=(8,3))  // Creates the size of the figure

# Create a bar plot of name vs grade
plt.bar(x=df_students.Name, height=df_students.Grade, color='orange')
# Also specified the color of the bar chart

# Customize the chart
plt.title('Student Grades') // Adds a title to the chart
plt.xlabel('Student')       // Adds label Student to the x axis
plt.ylabel('Grade')         // Adds label Grade to the y axis
plt.grid(color='#95a5a6', linestyle='--', linewidth=2, axis='y',
alpha=0.7)   // Adds a grid to easily determine the values for the bars
// The grid is the horizontal good-looking lines (could be missing)
plt.xticks(rotation=90)     // Rotates the student names vertically to
be able to read them (not to be intercalated)

# Display the plot
plt.show()
```

Result:



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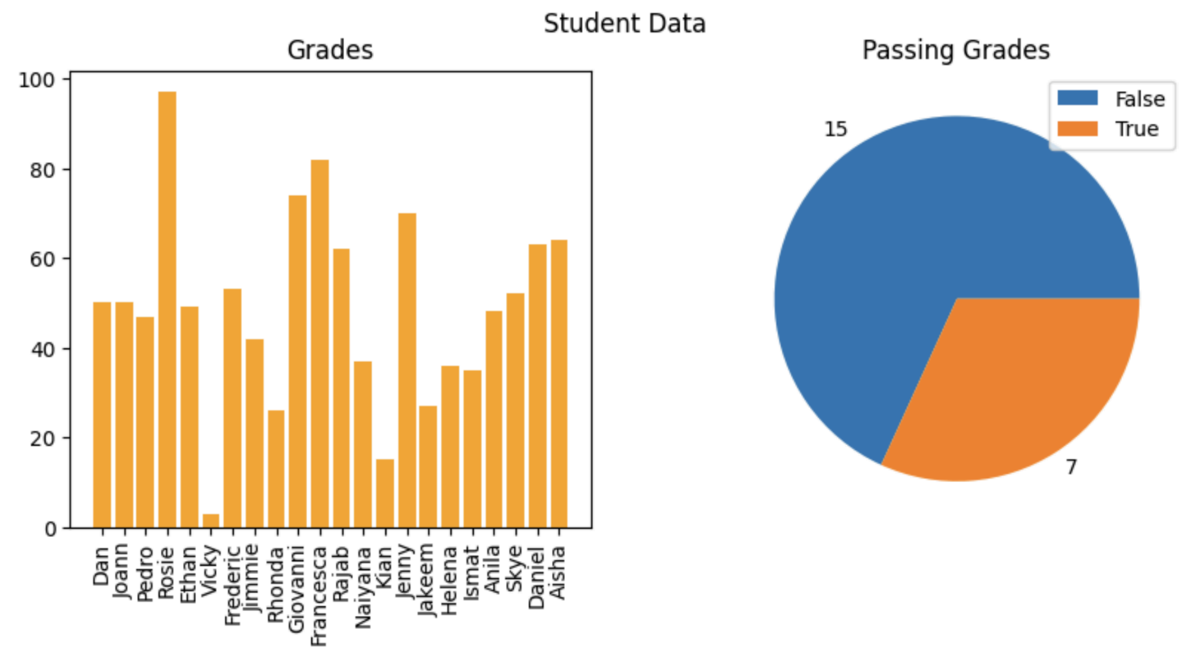
// A figure can contain multiple subplots. In the following example, there are two subplots, a bar chart and a pie chart:

```
# Create a figure for 2 subplots (1 row, 2 columns)
fig, ax = plt.subplots(1, 2, figsize = (10,4))

# Create a bar plot of name vs grade on the first axis
ax[0].bar(x=df_students.Name, height=df_students.Grade, color='orange')
ax[0].set_title('Grades')
ax[0].set_xticklabels(df_students.Name, rotation=90)

# Create a pie chart of pass counts on the second axis
pass_counts = df_students['Pass'].value_counts()
ax[1].pie(pass_counts, labels=pass_counts)
ax[1].set_title('Passing Grades')
ax[1].legend(pass_counts.keys().tolist())

# Add a title to the Figure
fig.suptitle('Student Data')

# Show the figure
fig.show()
```

Result:



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// Instead of Matplotlib.pyplot, DataFrame itself has methods to plot its data:

```
df_students.plot.bar(x='Name', y='StudyHours', color='teal',
figsize=(6,4))
```

// Here is how you can create a histogram for a set of data (in our case, student grades):

```
# Get the variable to examine
var_data = df_students['Grade']

# Create a Figure
fig = plt.figure(figsize=(10,4))

# Plot a histogram
plt.hist(var_data)

# Add titles and labels
plt.title('Data Distribution')
plt.xlabel('Value')
plt.ylabel('Frequency')

# Show the figure
fig.show()
```

Good to know definitions:

- The mean: A simple average based on adding together all of the values in the sample set and then dividing the total by the number of samples.
- The median: The value in the middle of the range of all of the sample values.
- The mode: The most commonly occurring value in the sample set*.

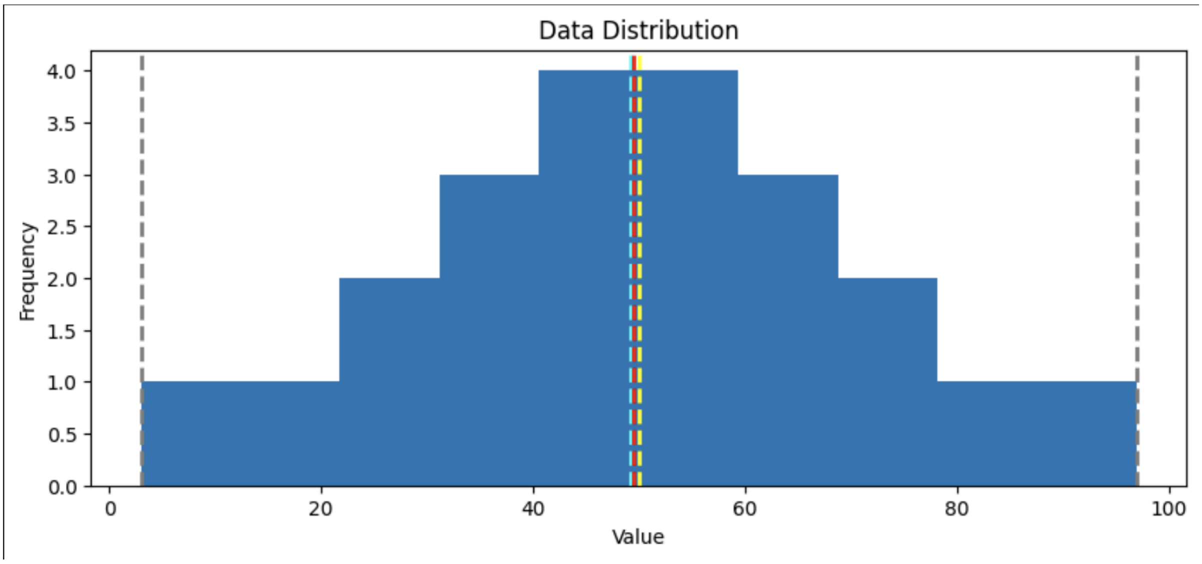
```
# Get the variable to examine
var = df_students['Grade']

# Get statistics
min_val = var.min()
max_val = var.max()
mean_val = var.mean()
med_val = var.median()
mod_val = var.mode()[0]
```

// We display all of the above variables in a histogram:

```
# Create a Figure
fig = plt.figure(figsize=(10,4))

# Plot a histogram
plt.hist(var)

# Add lines for the statistics
plt.axvline(x=min_val, color = 'gray', linestyle='dashed', linewidth =
2)
```

```
plt.axvline(x=mean_val, color = 'cyan', linestyle='dashed', linewidth = 2)
plt.axvline(x=med_val, color = 'red', linestyle='dashed', linewidth = 2)
plt.axvline(x=mod_val, color = 'yellow', linestyle='dashed', linewidth = 2)
plt.axvline(x=max_val, color = 'gray', linestyle='dashed', linewidth = 2)

# Add titles and labels
plt.title('Data Distribution')
plt.xlabel('Value')
plt.ylabel('Frequency')

# Show the figure
fig.show()
```

Result:



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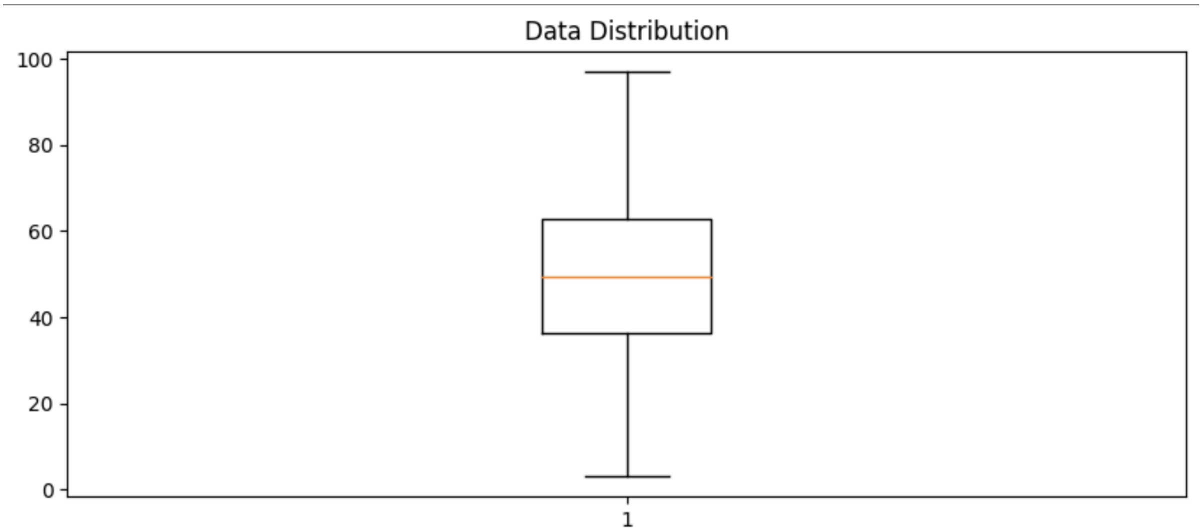
// Created a box plot for the student grades:

```
# Get the variable to examine
var = df_students['Grade']

# Create a Figure
fig = plt.figure(figsize=(10,4))

# Plot a histogram
plt.boxplot(var)

# Add titles and labels
plt.title('Data Distribution')
```

```
# Show the figure
fig.show()
```

Result:



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