Part 1: Setting Up Your Environment

1. **Install and Load Required Packages**:
   - If you haven't installed `ggplot2` yet, do so by running the following command:

     ```
     install.packages("ggplot2")
     ```

   - Load the `ggplot2` package:

     ```
     library(ggplot2)
     ```

2. **Create a New Script**:
   - Open RStudio and create a new script (File > New File > R Script).
   - Save the script as `week2_exercise.R`.

Part 2: Creating a Scatter Plot

1. **Create a Sample Dataset**:
   - Let's start by creating a simple dataset to use in your scatter plot:

     ```
     # Sample dataset
     set.seed(42)
     df <- data.frame(
       Variable1 = rnorm(100),
       Variable2 = rnorm(100)
     )
     ```

2. **Basic Scatter Plot**:
   - Use `ggplot2` to create a basic scatter plot:

     ```
     # Basic scatter plot
     ggplot(data = df, aes(x = Variable1, y = Variable2)) +
       geom_point() +
       labs(
         title = "Scatter Plot of Variable1 vs. Variable2",
         x = "Variable 1",
         y = "Variable 2"
       ) +
       theme_minimal()
     ```

   - **Task**: Run the script to generate the scatter plot. What does the plot reveal about the relationship between `Variable1` and `Variable2`?

3. **Customizing the Scatter Plot**:
   - Customize the plot by changing the color and size of the points:

     ```
     # Customized scatter plot
     ggplot(data = df, aes(x = Variable1, y = Variable2)) +
       geom_point(color = "blue", size = 3) +
       labs(
         title = "Customized Scatter Plot",
     ```

```
    x = "Variable 1",
    y = "Variable 2"
  ) +
  theme_minimal()
```

- **Task**: Experiment with different colors and sizes for the points. How does changing these aesthetics affect the readability and interpretation of the plot?

Part 3: Creating a Bar Chart

1. **Create a Categorical Dataset**:
   - Let's create a simple dataset with categorical data for the bar chart:

```
# Categorical dataset
categories <- c("Category A", "Category B", "Category C")
values <- c(23, 15, 19)
df_bar <- data.frame(Category = categories, Value = values)
```

2. **Basic Bar Chart**:
   - Create a basic bar chart using `ggplot2`:

```
# Basic bar chart
ggplot(data = df_bar, aes(x = Category, y = Value)) +
  geom_bar(stat = "identity") +
  labs(
    title = "Bar Chart of Categories",
    x = "Category",
    y = "Value"
  ) +
  theme_minimal()
```

   - **Task**: Run the script to generate the bar chart. What does the bar chart show about the distribution of values across categories?

3. **Customizing the Bar Chart**:
   - Customize the bar chart by adding colors and adjusting the theme:

```
# Customized bar chart
ggplot(data = df_bar, aes(x = Category, y = Value, fill =
Category)) +
  geom_bar(stat = "identity") +
  labs(
    title = "Customized Bar Chart",
    x = "Category",
    y = "Value"
  ) +
  theme_minimal() +
  theme(legend.position = "none")
```

   - **Task**: Try different colors and themes. How do these changes impact the visual appeal and effectiveness of the chart?

Part 4: Reflect and Document

1. **Reflect**:
    - Reflect on the process of creating and customizing plots. What did you find easy or challenging?
2. **Document Your Work**:
    - Add comments to your script explaining each step.
    - Save your script as `week2_exercise.R` and be prepared to discuss your experience in the next class.

Submission Instructions

- **Save your script**: Ensure your script is well-commented and saved as `week2_exercise_name.R`.
- **Upload**: Submit your script via TEAMS.
- **Discussion**: Be ready to discuss your experiences and any questions you have during the next class.

Expected Outcome

By the end of this exercise, you should be comfortable creating basic scatter plots and bar charts using `ggplot2`, as well as customizing these plots to enhance their clarity and impact. These skills will be crucial as you progress through the course and work with more complex data visualizations.
