

Module5 Question Bank

Introduction and Overview of Plots in Matplotlib

1. Explain the hierarchical structure of plots in Matplotlib. How do Figures and Axes interact within this structure?

Pyplot Basics: Creating Figures, Closing Figures, Format Strings, Plotting, Plotting Using pandas DataFrames, Displaying Figures, Saving Figures

2. How do you create and close a Figure in Matplotlib? Write a code snippet to demonstrate this.
3. Describe format strings in Matplotlib and give an example of how to use them.
4. How do you plot data points as lines and markers using `plt.plot()`? Provide an example.
5. How can you use pandas DataFrames for plotting in Matplotlib? Provide a code snippet.
6. How do you display a Figure in a Jupyter Notebook using Matplotlib? What is the importance of `plt.show()`?
7. Explain how to save a Figure in Matplotlib. What are some useful optional parameters for `plt.savefig()`?

Basic Text and Legend Functions: Labels, Titles, Text, Annotations, Legends

8. How do you set labels for the x-axis and y-axis in Matplotlib? Provide an example.
9. How do you add a title to a plot in Matplotlib? Explain the difference between setting the Figure title and the Axes title.
10. Describe how to add text at a specific location in a plot using Matplotlib.
11. How can you add annotations to a plot in Matplotlib? Provide a code snippet.
12. Explain how to add a legend to a plot in Matplotlib and customize its location.

Basic Plots: Bar Chart, Pie Chart, Stacked Bar Chart, Stacked Area Chart, Histogram, Box Plot, Scatter Plot, Bubble Plot

13. Write a code snippet to create a bar chart in Matplotlib.
14. How do you create a pie chart in Matplotlib? Provide an example.
15. Describe the steps to create a stacked bar chart in Matplotlib.
16. How do you create a stacked area chart using Matplotlib? Provide a code snippet.
17. Explain how to create a histogram in Matplotlib and customize the number of bins.
18. Write a code snippet to generate a box plot in Matplotlib.
19. How do you create a scatter plot in Matplotlib? Provide an example.
20. Describe how to make a bubble plot in Matplotlib. Provide a code snippet.

Layouts: Subplots, Tight Layout, Radar Charts, GridSpec

21. How do you create multiple subplots in a single Figure using Matplotlib? Provide an example.

22. Explain the purpose of `plt.tight_layout()` in Matplotlib.
23. How can you create a radar chart in Matplotlib? Provide a code snippet.
24. Describe how to use `GridSpec` for more complex subplot layouts in Matplotlib.

Images: Basic Image Operations, Writing Mathematical Expressions

25. How do you display an image using Matplotlib? Provide an example.
26. Explain how to save an image with customized dpi and format using Matplotlib.
27. How can you write and display mathematical expressions in Matplotlib? Provide a code snippet.(Give Example of 10 different Mathematical expressions)

Exercises and Activities

28. **Exercise:** Create a line plot showing the trend of stock prices over a period of one year. Label the x-axis as 'Month' and the y-axis as 'Price'.
29. **Activity:** Use a pandas DataFrame to plot a comparison of monthly sales data for two products. Display the plot and save it as 'sales_comparison.png'.
30. **Exercise:** Plot a bar chart of the top 5 programming languages by popularity. Add appropriate labels and a title.
31. **Activity:** Create a pie chart showing the market share of different smartphone brands. Make sure to label each slice.
32. **Exercise:** Generate a stacked bar chart comparing the quarterly revenue of three companies. Customize the colors and add a legend.
33. **Activity:** Plot a histogram of the ages of participants in a survey. Customize the number of bins and add axis labels and a title.
34. **Exercise:** Create a scatter plot of the height and weight of individuals. Add axis labels, a title, and a legend.
35. **Activity:** Display an image of your choice using Matplotlib. Save the displayed image with a resolution of 300 dpi.
36. **Exercise:** Write a script to generate a radar chart comparing the performance of different models in a machine learning competition.
37. **Activity:** Create a subplot layout with 2 rows and 2 columns. In each subplot, plot a different type of chart (line, bar, scatter, pie). Use `plt.tight_layout()` to adjust the spacing.
38. **Exercise:** Add annotations to a plot of your choice to highlight key data points. Save the plot as 'annotated_plot.png'.
39. **Activity:** Use `GridSpec` to create a complex layout with multiple subplots of different sizes. Populate the subplots with different types of plots and display the figure.