

# ASSIGNMENT

1. How can you create a histogram in Matplotlib?

A histogram is used to visualize the distribution of numerical data by grouping it into bins.

```
import matplotlib.pyplot as plt

# Example data
data = [1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5]

# Creating a histogram
plt.hist(data, bins=5, color='skyblue', edgecolor='black')

# Adding labels and title
plt.title("Histogram Example")
plt.xlabel("Values")
plt.ylabel("Frequency")

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

## Explanation:

- **data:** Input data for the histogram.
- **bins:** Number of intervals for grouping data.
- **color:** Fill color of the bars.
- **edgecolor:** Color of the bar edges.

2. What is the purpose of the `plt.subplots()` function in Matplotlib?

The `plt.subplots()` function is used to create a figure and multiple subplots in one call. It returns:

1. **Figure object:** The container for all subplots.
2. **Axes objects:** The individual plots within the figure.

## Code Example:

```
import matplotlib.pyplot as plt

# Create a 2x2 grid of subplots
fig, axes = plt.subplots(2, 2, figsize=(8, 6))
```

```
# Add data to each subplot
axes[0, 0].plot([1, 2, 3], [4, 5, 6]) # Top-left
axes[0, 1].scatter([1, 2, 3], [4, 5, 6]) # Top-right
axes[1, 0].bar([1, 2, 3], [4, 5, 6]) # Bottom-left
axes[1, 1].hist([1, 2, 2, 3, 3, 3]) # Bottom-right
```

```
# Adjust layout and display
plt.tight_layout()
plt.show()
```

#### **Explanation:**

- **Grid dimensions:** (2, 2) creates a 2x2 grid of plots.
- **figsize:** Specifies the figure's dimensions in inches.
- **axes[i, j]:** Access individual subplots.

### **3. How can you create a 3D plot in Matplotlib?**

A 3D plot is used for visualizing data with three dimensions (x, y, and z).

#### **Code Example:**

```
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import numpy as np
```

```
# Sample data
x = np.linspace(-5, 5, 100)
y = np.linspace(-5, 5, 100)
x, y = np.meshgrid(x, y)
z = np.sin(np.sqrt(x**2 + y**2))
```

```
# Create a 3D plot
fig = plt.figure(figsize=(8, 6))
ax = fig.add_subplot(111, projection='3d')
```

```
# Plot surface  
surf = ax.plot_surface(x, y, z, cmap='viridis')
```

```
# Add color bar  
fig.colorbar(surf)
```

```
# Add labels  
ax.set_xlabel("X Axis")  
ax.set_ylabel("Y Axis")  
ax.set_zlabel("Z Axis")  
  
# Display the plot  
plt.show()
```

**Explanation:**

- **Axes3D:** Enables 3D plotting.
- **plot\_surface:** Creates a 3D surface plot.
- **cmap:** Specifies the colormap for the surface.
- **set\_xlabel, set\_ylabel, set\_zlabel:** Set axis labels.