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.