Day 15 – Introduction to Matplotlib

Matplotlib is the basic plotting library of Python programming language. It is the most prominent tool among Python visualization packages. Matplotlib is highly efficient in performing wide range of tasks. It can produce publication quality figures in a variety of formats. It can export visualizations to all of the common formats like PDF, SVG, JPG, PNG, BMP and GIF. It can create popular visualization types – line plot, scatter plot, histogram, bar chart, error charts, pie chart, box plot, and many more types of plot. Matplotlib also supports 3D plotting. Many Python libraries are built on top of Matplotlib. For example, pandas and Seaborn are built on Matplotlib. They allow to access Matplotlib's methods with less code.

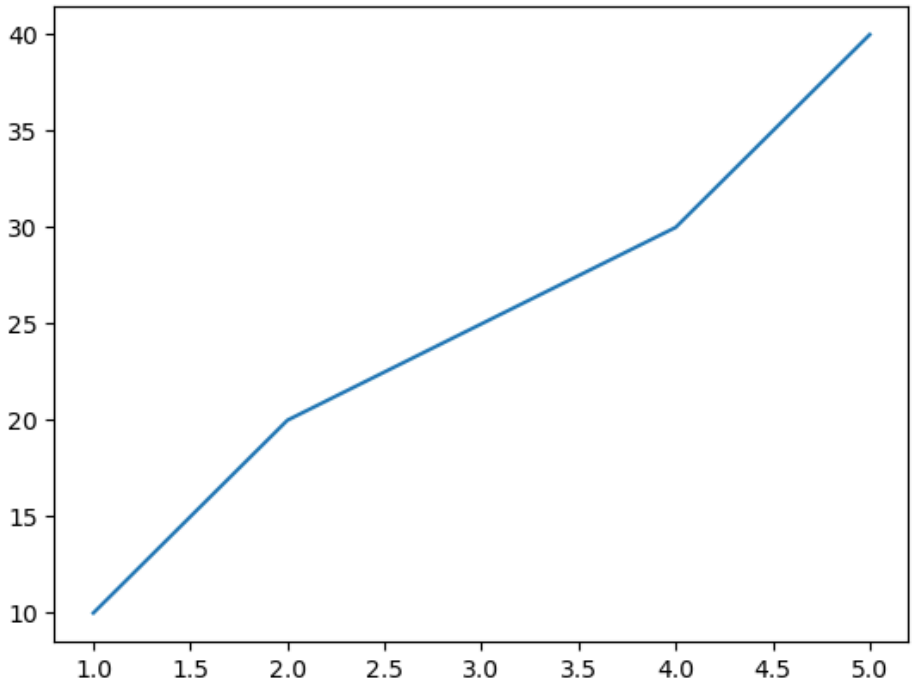
The project Matplotlib was started by John Hunter in 2002. Matplotlib was originally started to visualize Electrocorticography (ECoG) data of epilepsy patients during post-doctoral research in Neurobiology. The open-source tool Matplotlib emerged as the most widely used plotting library for the Python programming language. It was used for data visualization during landing of the Phoenix spacecraft in 2008.

In [3]:
```
import matplotlib.pyplot as plt
```

Basic Plot

In [4]:
```
x = [1, 2, 3, 4, 5]
y = [10, 20, 25, 30, 40]

plt.plot(x, y)
```

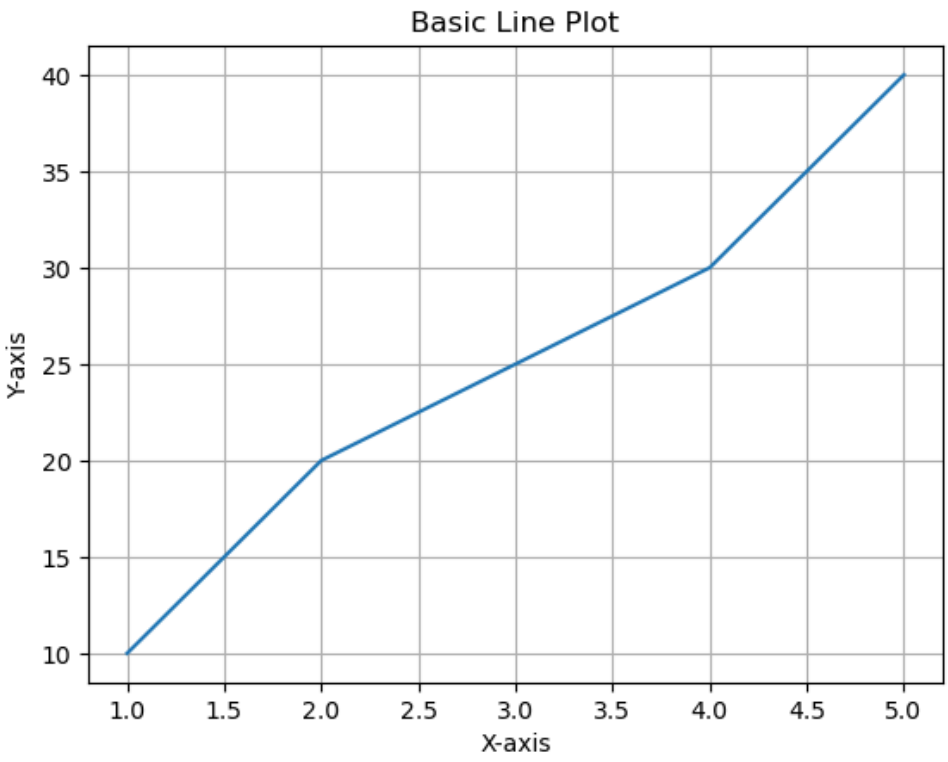
Out[4]:
```
[<matplotlib.lines.Line2D at 0x18a76b9c190>]
```



Adding Title, Labels and Grid

In [6]:
```
plt.plot(x, y)

plt.title("Basic Line Plot")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
```

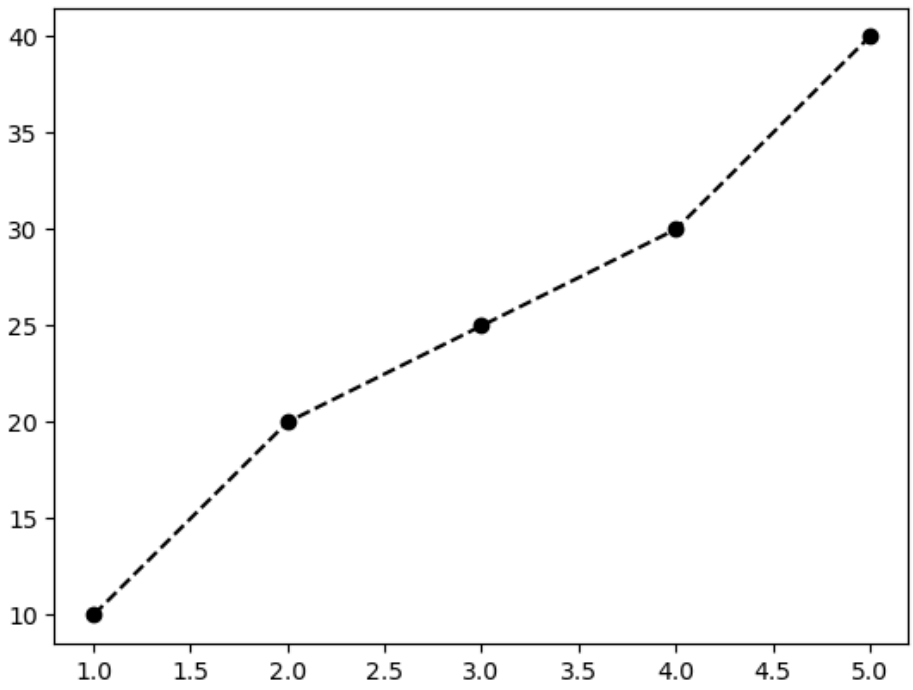
```
plt.grid(True)
plt.show()
```



Customizing (Color,Line,Marker)

In [8]:
```
plt.plot(x,y, color='black',linestyle='--',marker='o')
```

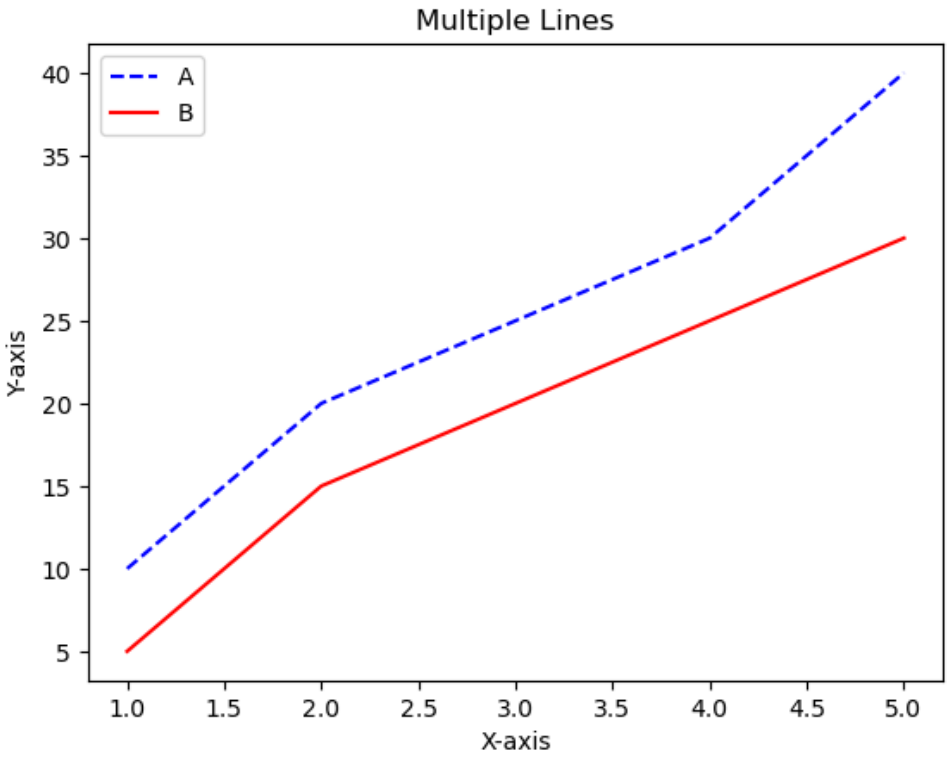
Out[8]:
```
[<matplotlib.lines.Line2D at 0x18a76a6dd10>]
```



Multiple Lines in One Plot

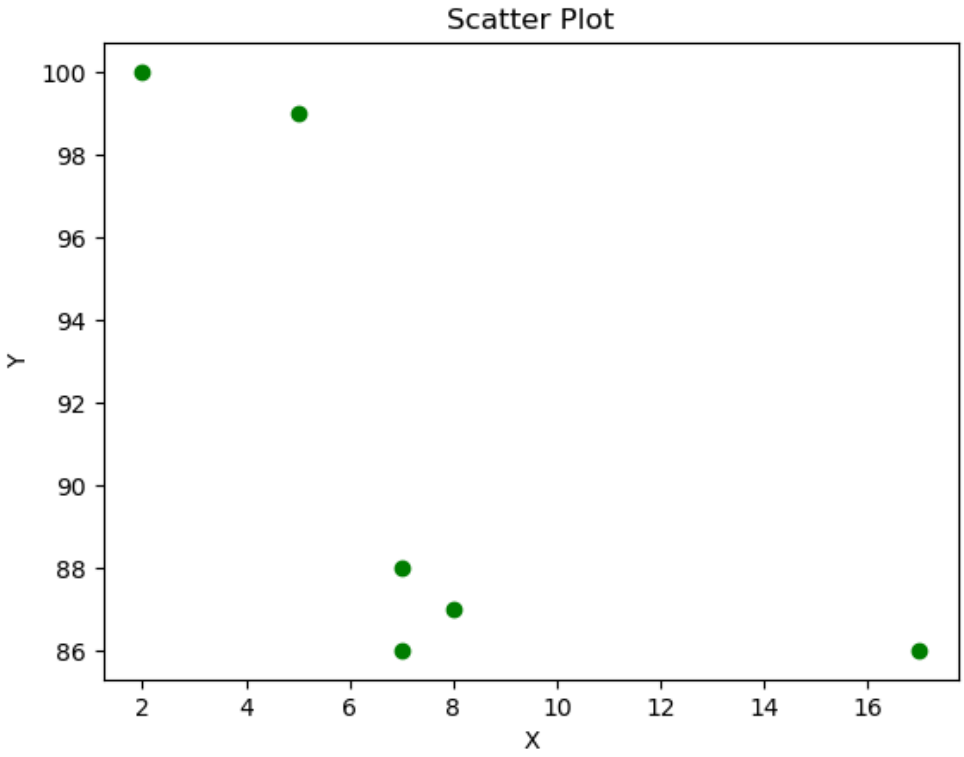
In [12]:
```
y1 = [5,15,20,25,30]

plt.plot(x, y, label="A", color="blue", linestyle="--")
plt.plot(x, y1, label="B", color="red", linestyle="-")
```

```
plt.title("Multiple Lines")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
plt.legend()
plt.show()
```



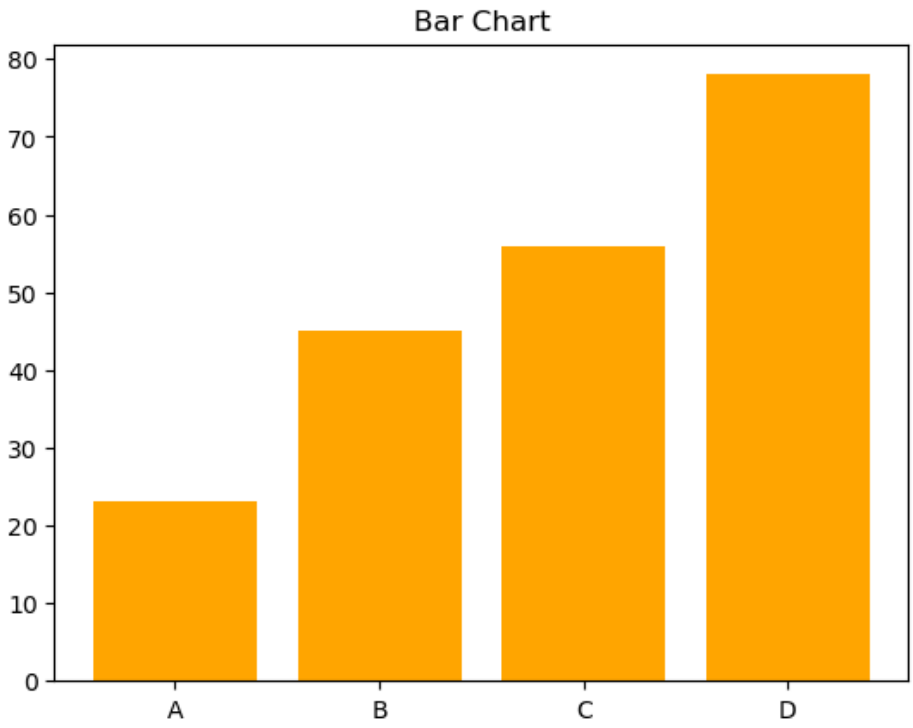
Scatter Plot

In [13]:
```
x = [5, 7, 8, 7, 2, 17]
y = [99, 86, 87, 88, 100, 86]
plt.scatter(x, y, color='green')
plt.title("Scatter Plot")
plt.xlabel("X")
plt.ylabel("Y")
plt.show()
```



Bar Chart

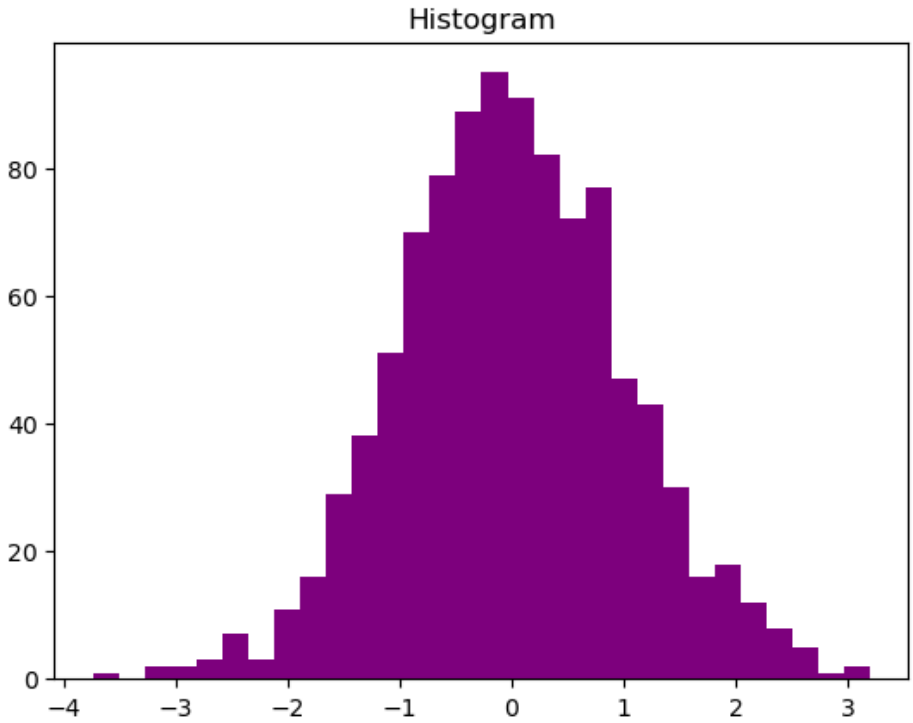
In [14]:
```
categories = ['A', 'B', 'C', 'D']
values = [23, 45, 56, 78]
plt.bar(categories, values, color='orange')
plt.title("Bar Chart")
plt.show()
```



Histogram

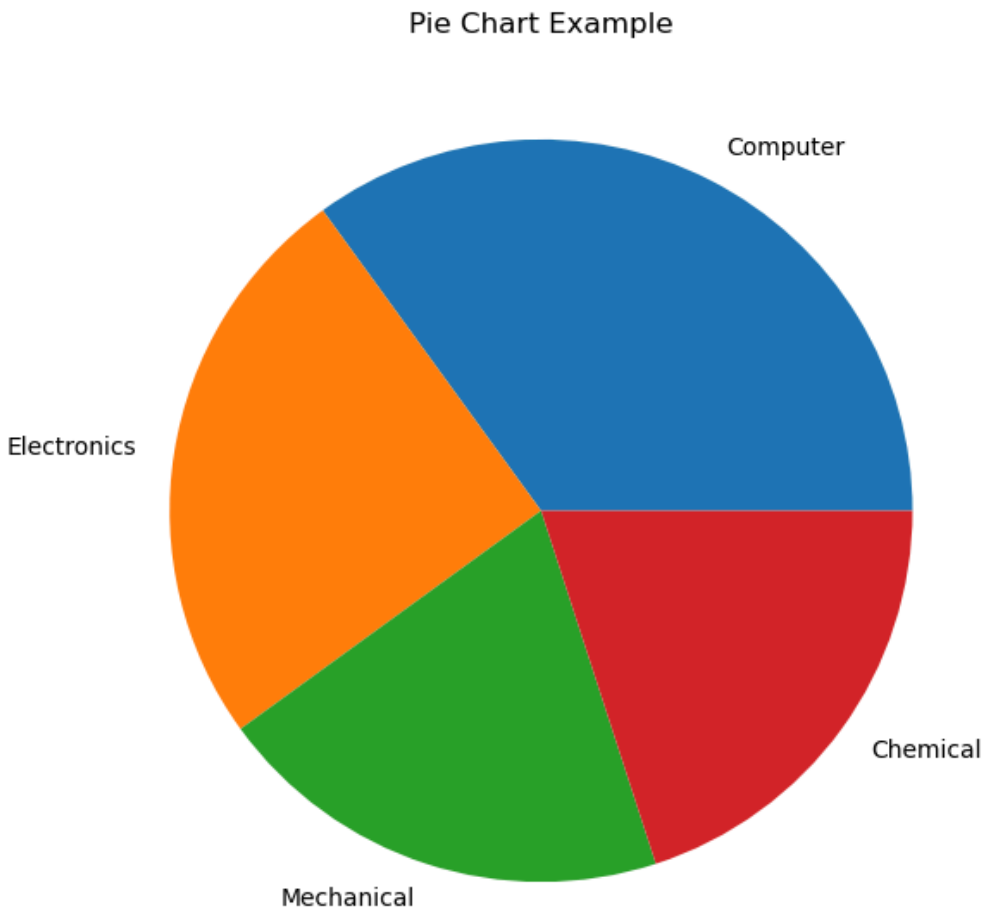
In [15]:
```
import numpy as np

data = np.random.randn(1000)
```

```
plt.hist(data, bins=30, color='purple')
plt.title("Histogram")
plt.show()
```



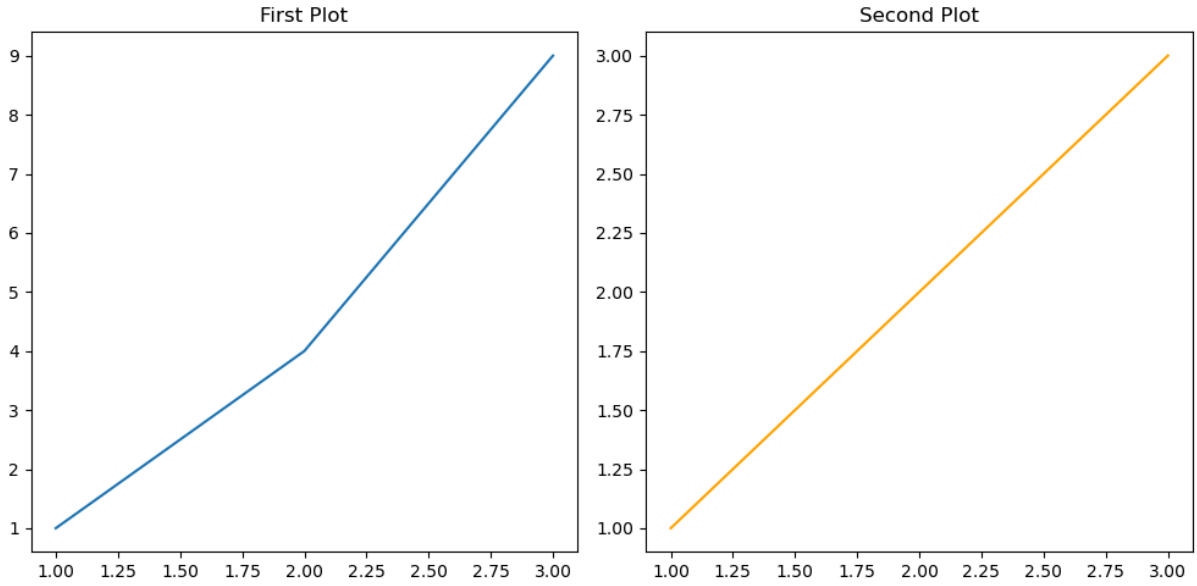
Pie Chart

In [18]:
```
plt.figure(figsize=(7,7))
x10 = [35, 25, 20, 20]
labels = ['Computer', 'Electronics', 'Mechanical', 'Chemical']
plt.pie(x10, labels=labels);
plt.title("Pie Chart Example")
plt.show()
```



Subplots (Multiple plots in one figure)

In [17]:
```
plt.figure(figsize=(10,5))

plt.subplot(1, 2, 1)
plt.plot([1,2,3], [1,4,9], label='Plot 1')
plt.title("First Plot")

plt.subplot(1, 2, 2)
plt.plot([1,2,3], [1,2,3], label='Plot 2', color='orange')
plt.title("Second Plot")

plt.tight_layout()
plt.show()
```



Saving a Plot to File

In [23]:
```
x = [1, 2, 3, 4, 5]
y = [10, 20, 25, 30, 40]
plt.plot(x, y)
plt.savefig("plot1.png")
```