



# Python Coding Schools

## 11<sup>th</sup> Lesson: Data Visualization

**Seed Academy**

# Agenda

- wk1. Installing Python, HelloWorld
- wk2. Arithmetic Operators
- wk3. Data Types : Integer, Floating point, Boolean, String
- wk4. Data Structures: List
- wk5. Data Structures: Set, Tuples
- wk6. Data Structures: Dictionary

# Agenda

- wk7. Control flows : IF statement
- wk8. Loops: While, For
- wk9. Function
- wk10. Class
- wk11. Data Visualization

# Class materials

<https://github.com/TaeheeJeong/seedacademy>

<https://github.com/TaeheeJeong/SummerCoding2023>

# Matplotlib

- Matplotlib is an amazing visualization library in Python for 2D plots of arrays.
- Matplotlib consists of several plots like line, bar, scatter, histogram etc.
- Pyplot is a Matplotlib module that provides functions that interact with the figure i.e. creates a figure, decorates the plot with labels, and creates a plotting area in a figure.
- `python -mpip install -U matplotlib`
- `import matplotlib.pyplot as plt`

# Line plot

```
# x-axis values
```

```
x = [5, 2, 9, 4, 7]
```

```
# Y-axis values
```

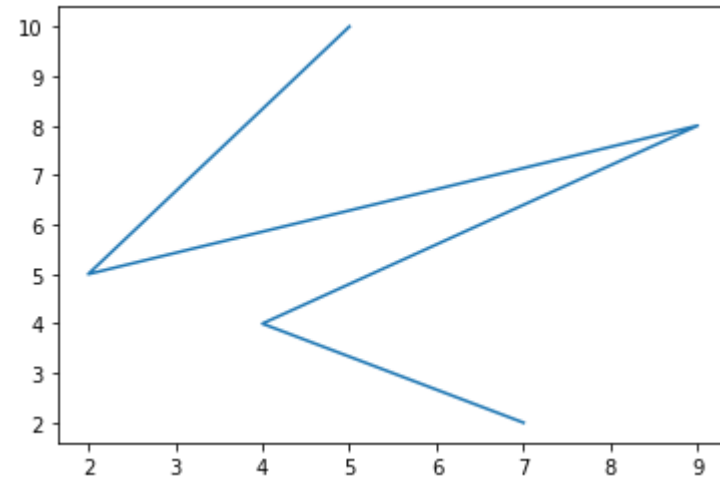
```
y = [10, 5, 8, 4, 2]
```

```
# Function to plot
```

```
plt.plot(x,y)
```

```
# function to show the plot
```

```
plt.show()
```



# Scatter plot

```
# x-axis values
```

```
x = [5, 2, 9, 4, 7]
```

```
# Y-axis values
```

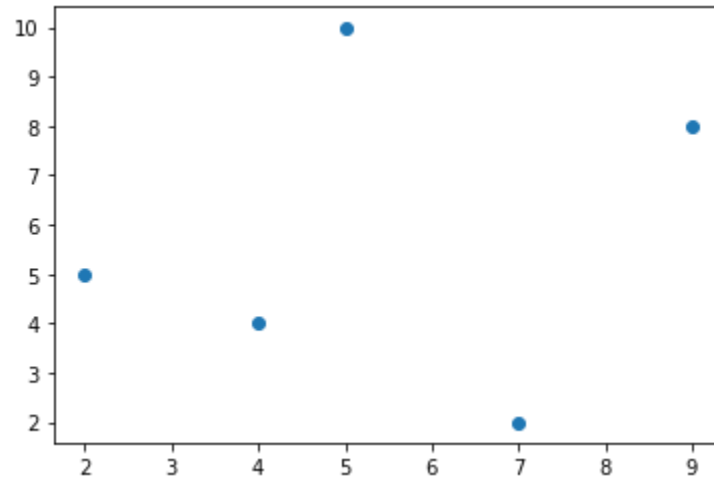
```
y = [10, 5, 8, 4, 2]
```

```
# Function to plot
```

```
plt.scatter(x,y)
```

```
# function to show the plot
```

```
plt.show()
```



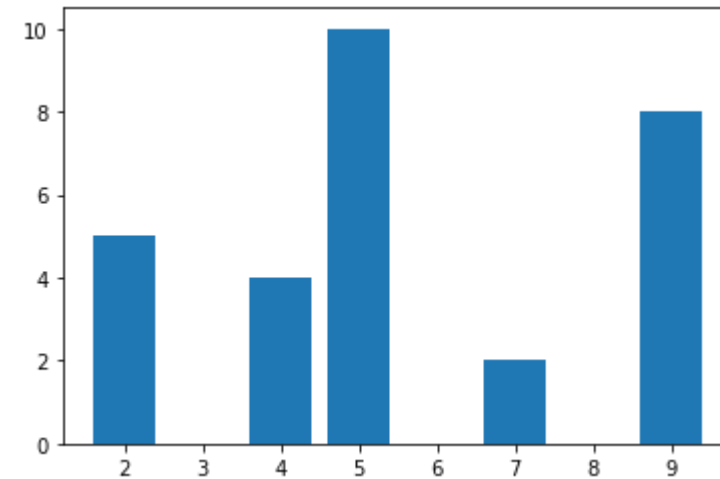
# Bar plot

```
# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot
plt.bar(x,y)

# function to show the plot
plt.show()
```





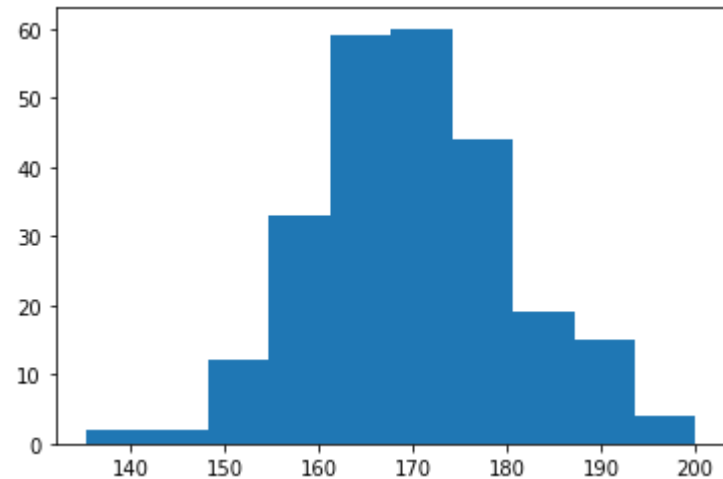
# Histogram

```
# importing numpy module
import numpy as np

# values
x = np.random.normal(170, 10, 250)

# Function to plot
plt.hist(x)

# function to show the plot
plt.show()
```



# Color Reference

Color Syntax	Description
'r'	Red
'g'	Green
'b'	Blue
'c'	Cyan
'm'	Magenta
'y'	Yellow
'k'	Black
'w'	White

# Line Reference

Line Syntax	Description
'_'	Solid line
'.'	Dotted line
'--'	Dashed line
'-.'	Dashed/dotted line

# Marker Reference

Marker Syntax	Description
'o'	Circle
'*'	Star
'.'	Point
','	Pixel
'x'	X
'+'	Plus
's'	Square
'd'	Diamond

Marker Syntax	Description
'p'	Pentagon
'h'	Hexagon
'v'	Triangle Down
'^'	Triangle Up
'<'	Triangle Left
'>'	Triangle Right

# Adding markers

```
# x-axis values
```

```
x = [5, 2, 9, 4, 7]
```

```
# Y-axis values
```

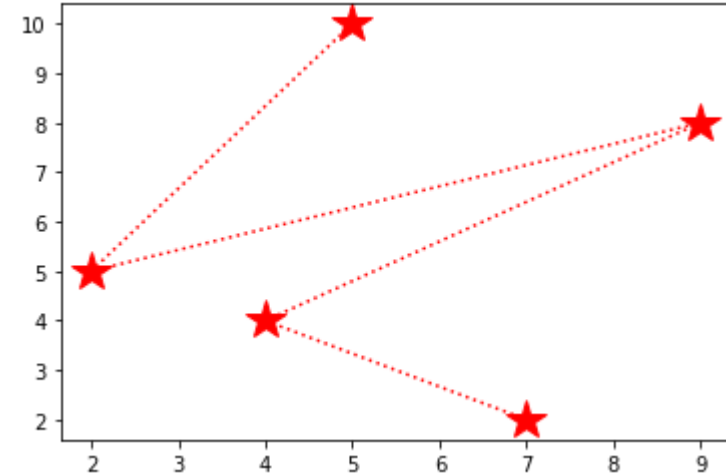
```
y = [10, 5, 8, 4, 2]
```

```
# Function to plot
```

```
plt.plot(x,y, color='r', linestyle = 'dotted', marker='*', ms=20)
```

```
# function to show the plot
```

```
plt.show()
```



# Adding title and labels

```
# x-axis values
x = [5, 2, 9, 4, 7]

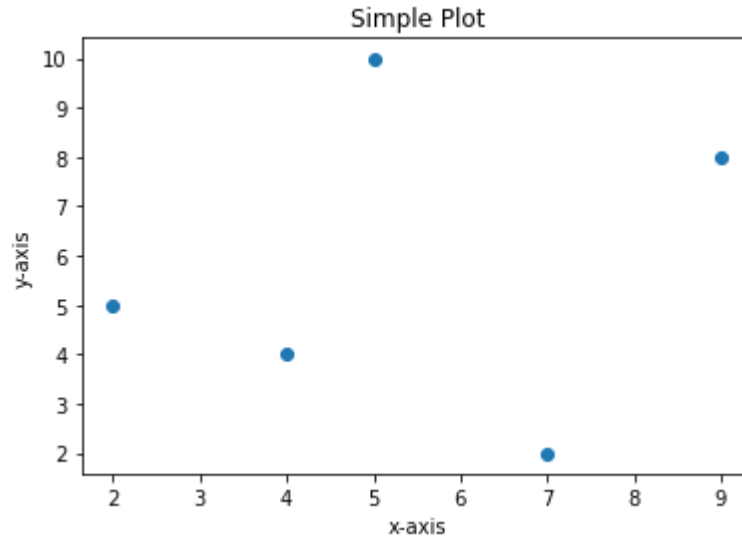
# Y-axis values
y = [10, 5, 8, 4, 2]

# Function to plot
plt.scatter(x,y)

# Adding the title
plt.title("Simple Plot")

# Adding the labels
plt.ylabel("y-axis")
plt.xlabel("x-axis")

# function to show the plot
plt.show()
```



# Adding grid

```
# x-axis values
x = [5, 2, 9, 4, 7]

# Y-axis values
y = [10, 5, 8, 4, 2]

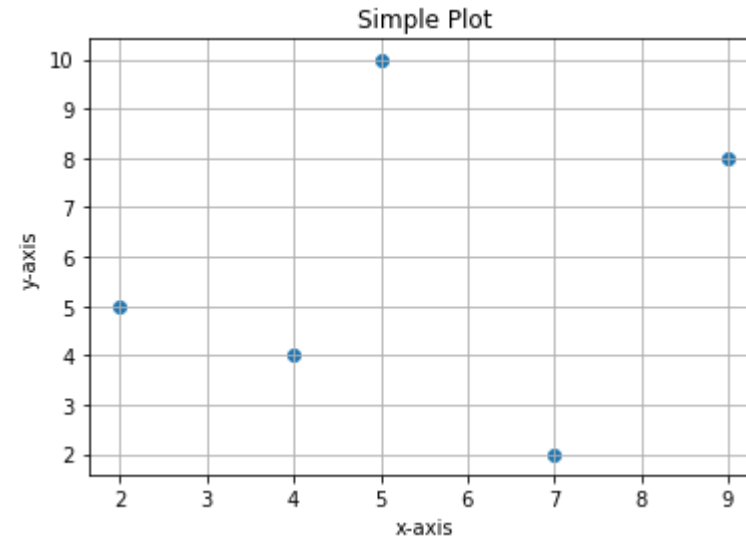
# Function to plot
plt.scatter(x,y)

# Adding the title
plt.title("Simple Plot")

# Adding the labels
plt.ylabel("y-axis")
plt.xlabel("x-axis")

# Adding the grid
plt.grid()

# function to show the plot
plt.show()
```



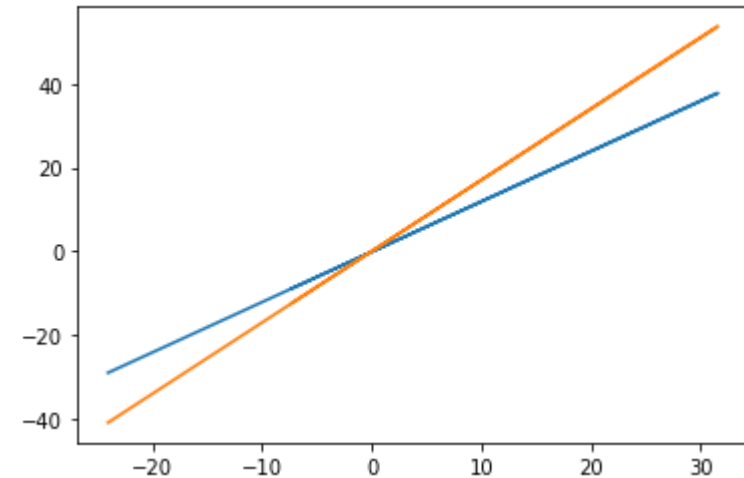
# Multiple plots

```
# importing modules
import matplotlib.pyplot as plt
import numpy as np

# generate sample data
x = np.random.normal(1, 10, 250)
y1 = 1.2 * x + 0.1* np.random.normal(0,1)
y2 = 1.7 * x + 0.1* np.random.normal(0,1)

# Function to plot
plt.plot(x,y1)
plt.plot(x,y2)

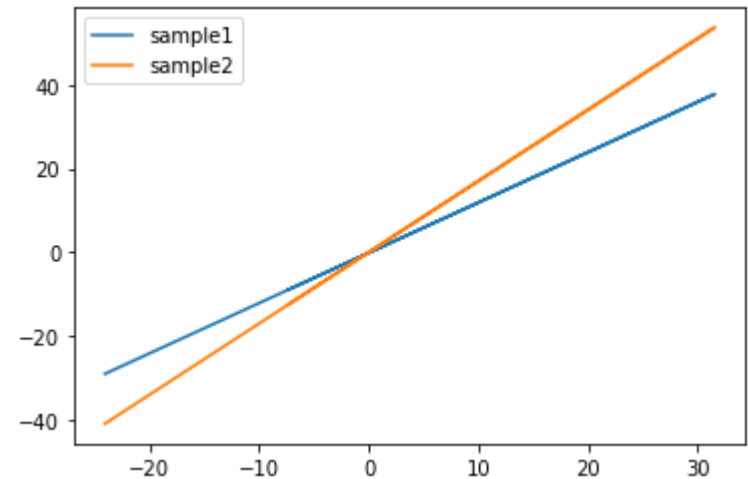
# function to show the plot
plt.show()
```





# Adding legends

```
# Function to plot  
plt.plot(x,y1, label='sample1')  
plt.plot(x,y2, label='sample2')  
  
# adding legends  
plt.legend()  
  
# function to show the plot  
plt.show()
```



# Adding labels and grid

```
# Function to plot
```

```
plt.plot(x,y1, label='sample1')
```

```
plt.plot(x,y2, label='sample2')
```

```
# adding legends
```

```
plt.legend()
```

```
# Adding the labels
```

```
plt.ylabel("y-axis")
```

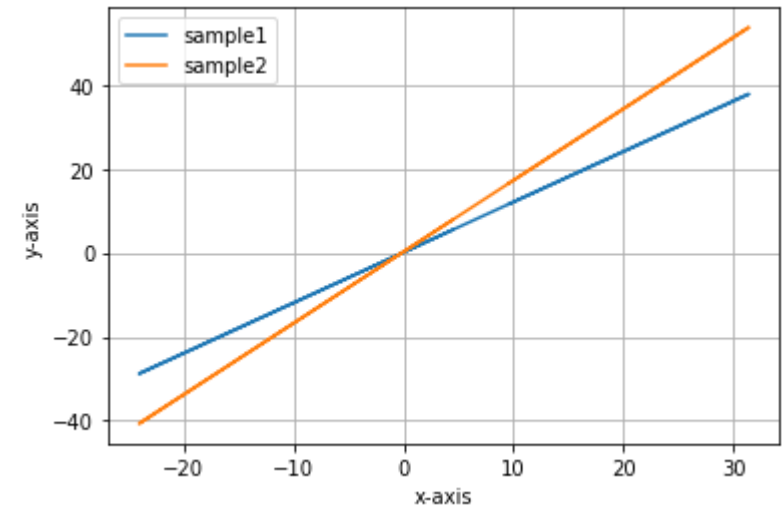
```
plt.xlabel("x-axis")
```

```
# Adding the grid
```

```
plt.grid()
```

```
# function to show the plot
```

```
plt.show()
```



# Interactive mode

```
%matplotlib
```

```
# Function to plot
```

```
plt.plot(x,y1, label='sample1')
```

```
plt.plot(x,y2, label='sample2')
```

```
# adding legends
```

```
plt.legend()
```

```
# Adding the labels
```

```
plt.ylabel("y-axis")
```

```
plt.xlabel("x-axis")
```

```
# Adding the grid
```

```
plt.grid()
```

```
# function to show the plot
```

```
plt.show()
```

