Lab 14

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CO1: To write, test, and debug simple Python programs

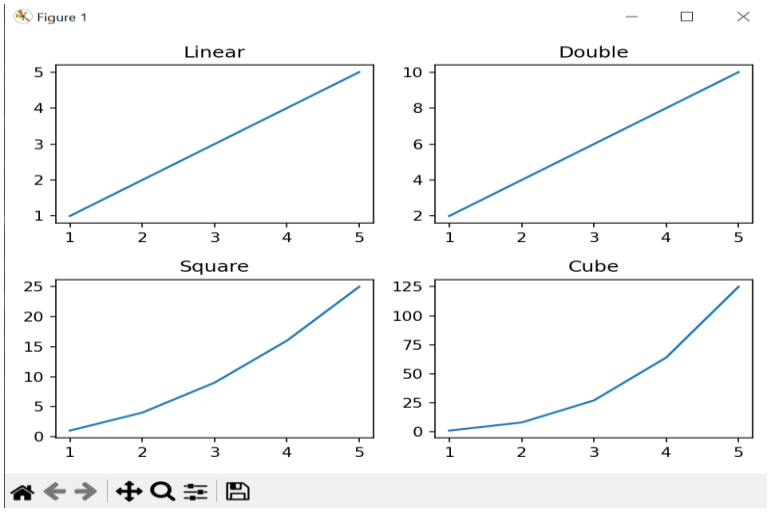
CO2: To implement Python programs with conditional, loops and functions

Task 1:- How to Add Title to Subplots in Matplotlib (Using set_title() method)

Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x = np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
ax[0, 0].plot(x, x)
ax[0, 1].plot(x, x*2)
ax[1, 0].plot(x, x*x)
ax[1, 1].plot(x, x*x*x)
ax[0, 0].set_title("Linear")
ax[0, 1].set_title("Double")
ax[1, 0].set_title("Square")
ax[1, 1].set_title("Cube")
fig.tight_layout()
plt.show()
```

Output:

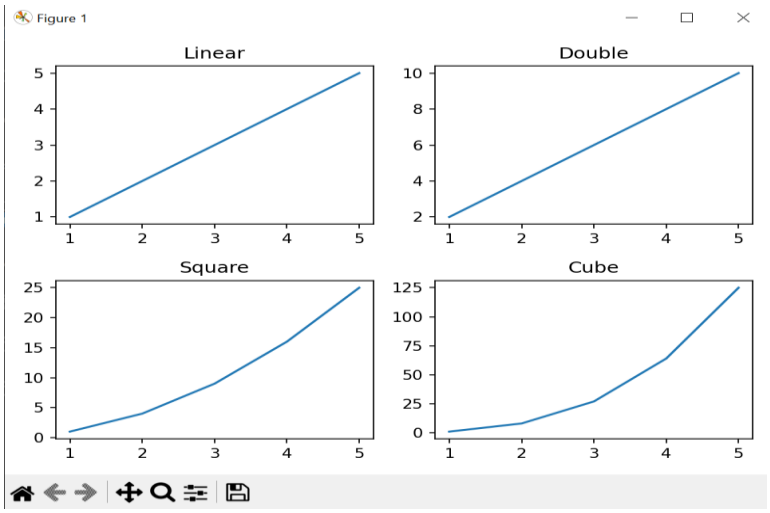


Task 2:- (Using title.set_text() method)

Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x=np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
ax[0, 0].plot(x, x)
ax[0, 1].plot(x, x*2)
ax[1, 0].plot(x, x*x)
ax[1, 1].plot(x, x*x*x)
ax[0, 0].title.set_text("Linear")
ax[0, 1].title.set_text("Double")
ax[1, 0].title.set_text("Square")
ax[1, 1].title.set_text("Cube")
fig.tight_layout()
plt.show()
```

Output:



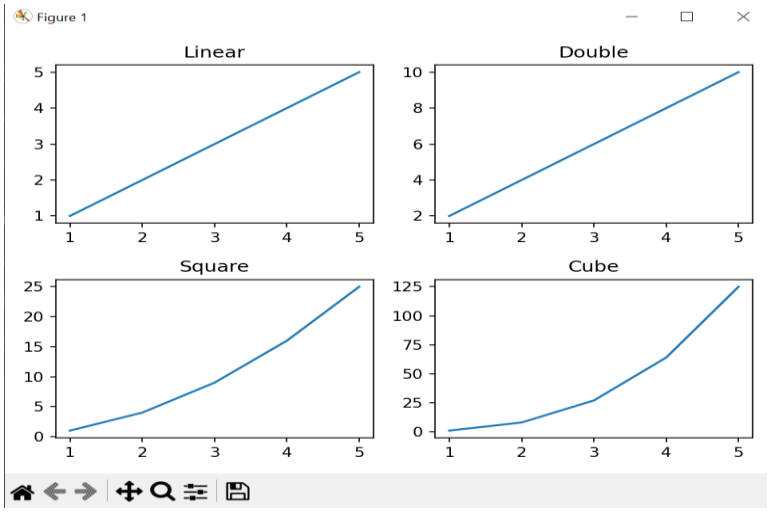
Task 3:- (Using plt.gca().set_title() method)

Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x=np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
title = ["Linear", "Double", "Square", "Cube"]
y = [x, x*2, x*x, x*x*x]
for i in range(4):
    plt.subplot(2, 2, i+1)
    plt.plot(x, y[i])
```

```
        plt.gca().set_title(title[i])
fig.tight_layout()
plt.show()
```

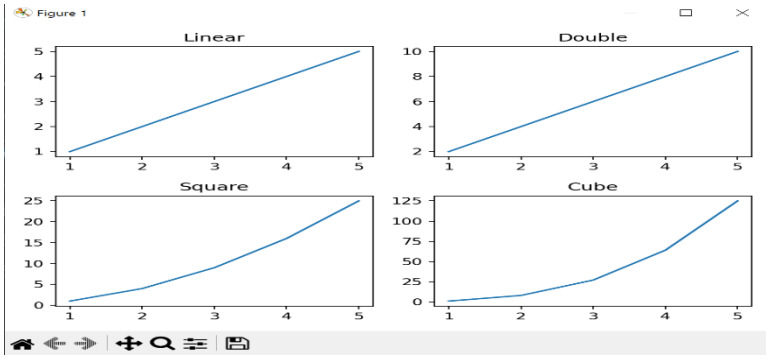
Output:



Task 4:- (Using plt.gca().title.set_text() method)Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x=np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
title = ["Linear","Double","Square","Cube"]
y = [x, x*2, x*x, x*x*x]
for i in range(4):
        plt.subplot(2, 2, i+1)
        plt.plot(x, y[i])
        plt.gca().title.set_text(title[i])
fig.tight_layout()
plt.show()
```

Output:

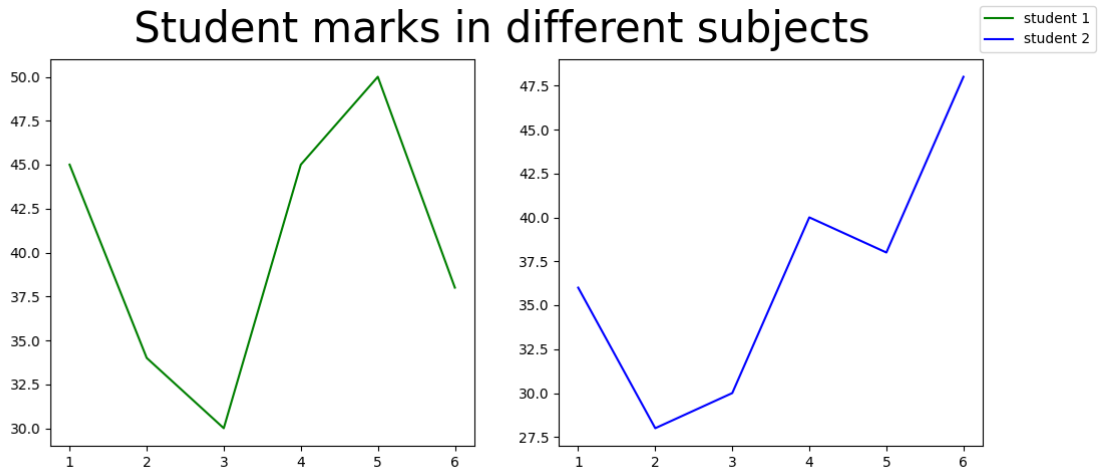


Task 5:- Setting a Single Title for All the Subplots Example - 1

Python Code:

```
import matplotlib.pyplot as plt
import numpy as np
fig, ax = plt.subplots(2, 2)
ax[0][0].plot(np.random.randint(0, 5, 5), np.random.randint(0, 5, 5))
ax[0][1].plot(np.random.randint(0, 5, 5), np.random.randint(0, 5, 5))
ax[1][0].plot(np.random.randint(0, 5, 5), np.random.randint(0, 5, 5))
ax[1][1].plot(np.random.randint(0, 5, 5), np.random.randint(0, 5, 5))
fig.suptitle(' Set a Single Main Title for All the Subplots ', fontsize=30)
plt.show()
```

Output:

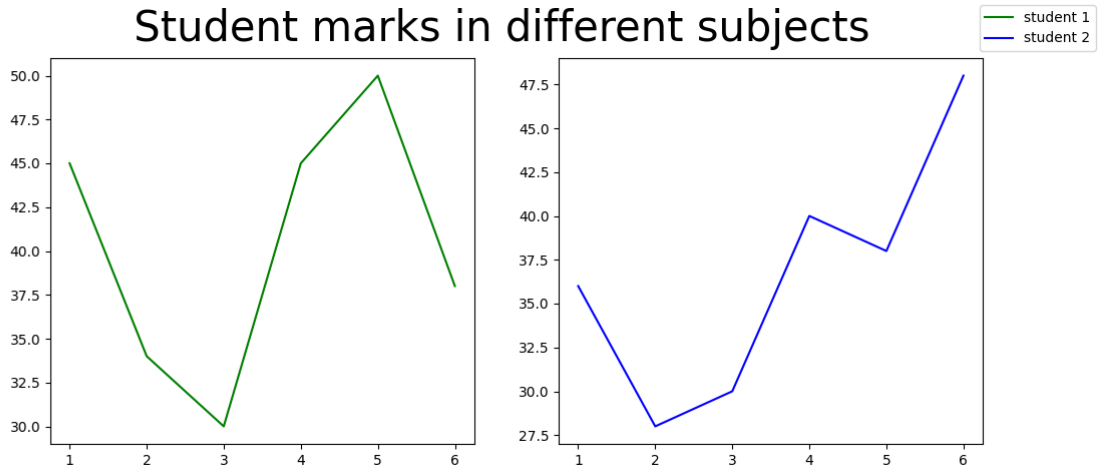


Task 6:- Setting a Single Title for All the Subplots Example - 1

Python Code:

```
import matplotlib.pyplot as plt
fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(12, 5))
x1 = [1, 2, 3, 4, 5, 6]
y1 = [45, 34, 30, 45, 50, 38]
y2 = [36, 28, 30, 40, 38, 48]
labels = ["student 1", "student 2"]
fig.suptitle(' Student marks in different subjects ', fontsize=30)
l1 = ax1.plot(x1, y1 , color = 'g')
l2 = ax2.plot(x1, y2 , color = 'b')
fig.legend([l1, l2], labels=labels,
                    loc="upper right")
plt.subplots_adjust(right=0.9)
plt.show()
```

Output:

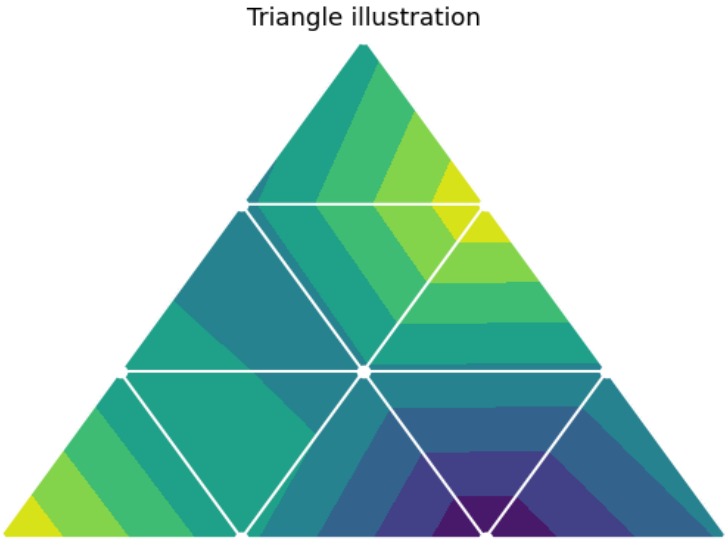


Task 5:- How to Turn Off the Axes for Subplots in Matplotlib? Using matplotlib.axes.Axes.axis()

Python Code:

```
import matplotlib.pyplot as plt
import matplotlib.tri as mtri
import numpy as np
x = np.asarray([0, 1, 2, 3, 0.5,
                1.5, 2.5, 1, 2,
                1.5])
y = np.asarray([0, 0, 0, 0, 1.0,
                1.0, 1.0, 2, 2,
                3.0])
triangles = [[0, 1, 4], [1, 5, 4],
             [2, 6, 5], [4, 5, 7],
             [5, 6, 8], [5, 8, 7],
             [7, 8, 9], [1, 2, 5],
             [2, 3, 6]]
triang = mtri.Triangulation(x, y, triangles)
z = np.cos(1.5 * x) * np.cos(1.5 * y)
fig, axs = plt.subplots()
axs.tricontourf(triang, z)
axs.triplot(triang, 'go-', color ='white')
axs.set_axis_off()
axs.set_title('Triangle illustration')
plt.show()
```

Output:

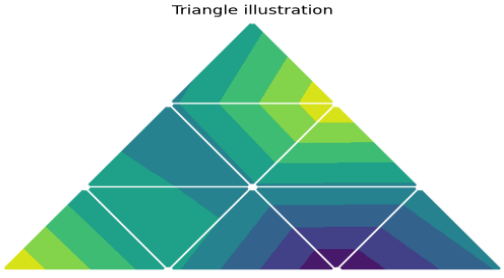


Task 6:- How to Turn Off the Axes for Subplots in Matplotlib? Using matplotlib.pyplot.axis()

Python Code:

```
import matplotlib.pyplot as plt
import numpy as np
geeksx = np.array([24.40, 110.25, 20.05,
                   22.00, 61.90, 7.80,
                   15.00])
geeksy = np.array([24.40, 110.25, 20.05,
                   22.00, 61.90, 7.80,
                   15.00])
fig, ax = plt.subplots()
ax.xcorr(geeksx, geeksy, maxlags = 6,
         color ="green")
ax.set_axis_off()
ax.set_title('Time series graph')
plt.show()
```

Output:

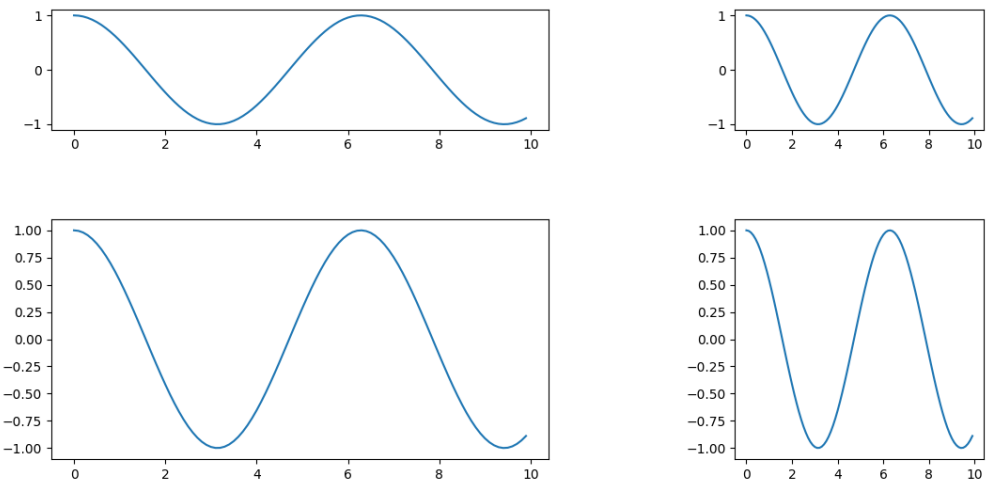


Task 6:- How to Create Different Subplot Sizes in Matplotlib? Create Different Subplot Sizes in Matplotlib using Gridspec

Python Code:

```
import matplotlib.pyplot as plt
from matplotlib import gridspec
import numpy as np
fig = plt.figure()
fig.set_figheight(8)
fig.set_figwidth(8)
spec = gridspec.GridSpec(ncols=2, nrows=2,
                         width_ratios=[2, 1], wspace=0.5,
                         hspace=0.5, height_ratios=[1, 2])
x = np.arange(0, 10, 0.1)
y = np.cos(x)
ax0 = fig.add_subplot(spec[0])
ax0.plot(x, y)
ax1 = fig.add_subplot(spec[1])
ax1.plot(x, y)
ax2 = fig.add_subplot(spec[2])
ax2.plot(x, y)
ax3 = fig.add_subplot(spec[3])
ax3.plot(x, y)
plt.show()
```

Output:



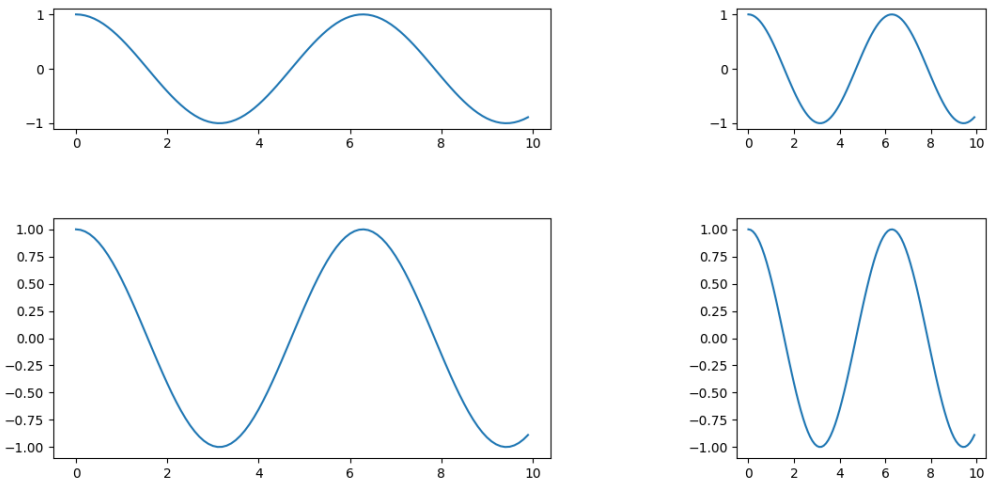
Task 7:- How to Create Different Subplot Sizes in Matplotlib? Create Different Subplot Sizes in Matplotlib gridspec_kw

Python Code:

```
import matplotlib.pyplot as plt
import numpy as np
```

```
fig, ax = plt.subplots(nrows=2, ncols=2, figsize=(7, 7),
                                        gridspec_kw={
                                                'width_ratios': [3, 3],
                                                'height_ratios': [3, 3],
                                        'wspace': 0.4,
                                        'hspace': 0.4})
x = np.arange(0, 10, 0.1)
y = np.tan(x)
ax[0][0].plot(x, y)
ax[0][1].plot(x, y)
ax[1][0].plot(x, y)
ax[1][1].plot(x, y)
plt.show()
```

Output:

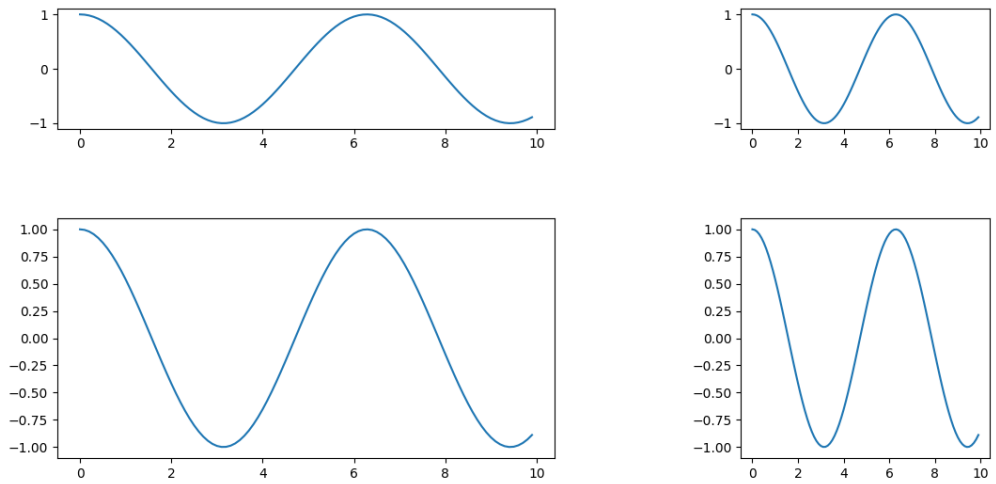


Task 8:- How to Create Different Subplot Sizes in Matplotlib? Create Different Subplot Sizes in Matplotlib subplot2gridPython Code:

```
import matplotlib.pyplot as plt
import numpy as np
fig = plt.figure()
fig.set_figheight(6)
fig.set_figwidth(6)
ax1 = plt.subplot2grid(shape=(3, 3), loc=(0, 0), colspan=3)
ax2 = plt.subplot2grid(shape=(3, 3), loc=(1, 0), colspan=1)
ax3 = plt.subplot2grid(shape=(3, 3), loc=(1, 2), rowspan=2)
ax4 = plt.subplot2grid((3, 3), (2, 0))
ax5 = plt.subplot2grid((3, 3), (2, 1), colspan=1)
x = np.arange(0, 10, 0.1)
y = np.cos(x)
ax1.plot(x, y)
ax1.set_title('ax1')
ax2.plot(x, y)
ax2.set_title('ax2')
```

```
ax3.plot(x, y)
ax3.set_title('ax3')
ax4.plot(x, y)
ax4.set_title('ax4')
ax5.plot(x, y)
ax5.set_title('ax5')
plt.tight_layout()
plt.show()
```

Output:

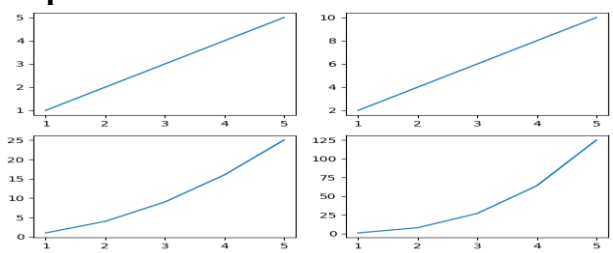


Task 9:- How to set the spacing between subplots in Matplotlib in Python? Using tight_layout() method to set the spacing between subplots

Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x=np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
ax[0, 0].plot(x, x)
ax[0, 1].plot(x, x*2)
ax[1, 0].plot(x, x*x)
ax[1, 1].plot(x, x*x*x)
fig.tight_layout()
plt.show()
```

Output:



Task 10:- How to set the spacing between subplots in Matplotlib in Python? Using pad
Python Code:

```
import numpy as np
import matplotlib.pyplot as plt
x=np.array([1, 2, 3, 4, 5])
fig, ax = plt.subplots(2, 2)
ax[0, 0].plot(x, x)
ax[0, 1].plot(x, x*2)
ax[1, 0].plot(x, x*x)
ax[1, 1].plot(x, x*x*x)
fig.tight_layout(pad=5.0)
plt.show()
```

Output: