

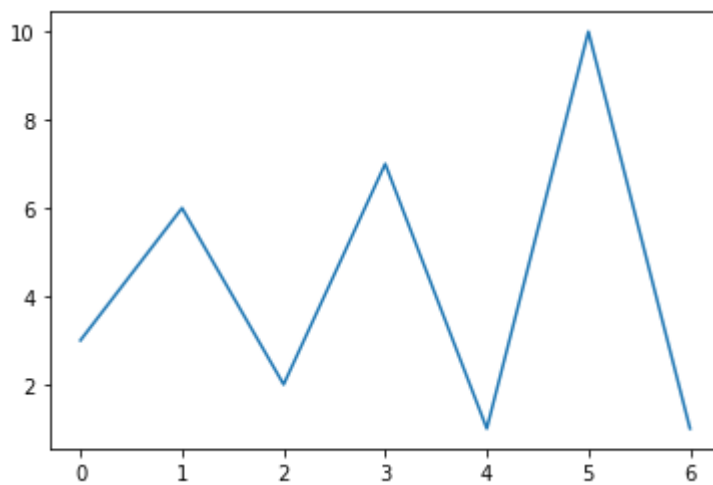
```
print("Welcome to Data Visualisation with Matplotlib")
```

Welcome to Data Visualisation with Matplotlib

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

```
x_val=[0,1,2,3,4,5,6]
y_val=[3,6,2,7,1,10,1]
plt.plot(x_val,y_val)
```

[<matplotlib.lines.Line2D at 0x7fbae1a4d8e0>]

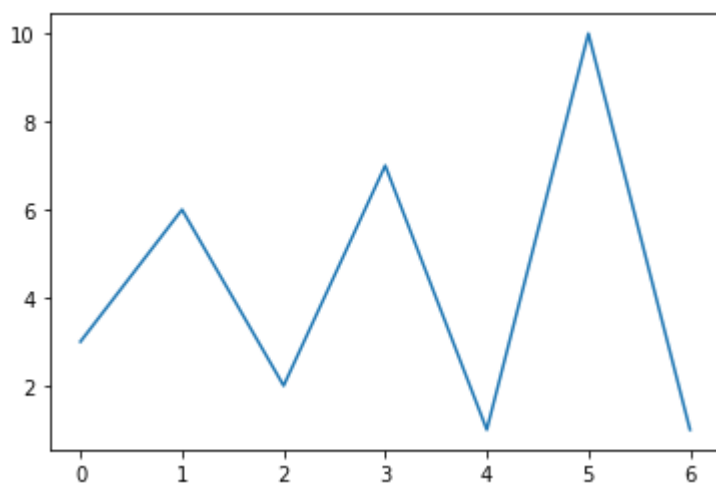


Screenshot 2022-09-14 at 21.23.41  Screenshot%202022-09-14%20at%2021.23.41.png

```
y_val=[3,6,2,7,1,10,1]
plt.plot(y_val)
```

```
[<matplotlib.lines.Line2D at 0x7fbad00bec70>]
```

```
y_val=[3,6,2,7,1,10,1]  
plt.plot(y_val)  
plt.savefig("figure1")
```



```
!ls
```

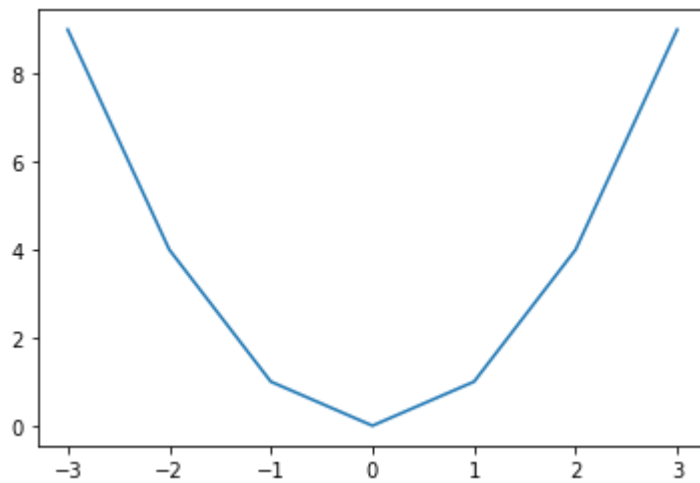
```
Data Visualisation with Matplotlib.ipynb  
Numpy Assessments.ipynb  
Numpy-1  
Numpy-2 Lecture Notes.ipynb  
Numpy-2.ipynb  
Numpy-3.ipynb  
Numpy-4.ipynb  
Numpy-5.ipynb  
Pandas-1.ipynb  
Pandas-2.ipynb  
Pandas-3.ipynb  
Pandas-4.ipynb  
Pandas-5.ipynb  
Pandas-6.ipynb  
Pfizer_1.csv  
directors.csv  
dog.jpeg  
figure.png  
figure1.png  
fitness.txt  
gapminder.csv  
movies.csv  
pfizer_result.csv  
pfizer_result1.csv  
pfizer_result2.csv  
pfizer_result3.csv
```

```
plt.plot?
```

```
# y=x**2
```

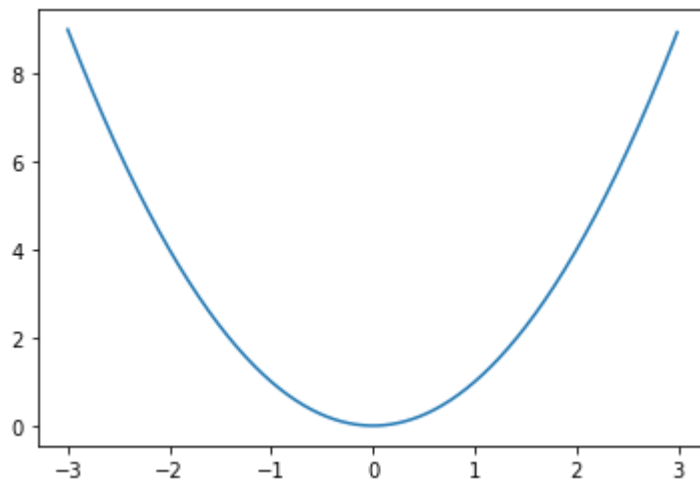
```
x_val=[-3,-2,-1,0,1,2,3]
y_val=[9,4,1,0,1,4,9]
plt.plot(x_val,y_val)
```

[<matplotlib.lines.Line2D at 0x7fbaf055a0a0>]



```
x_val=np.arange(-3,3,0.01)
y_val=x_val**2
plt.plot(x_val,y_val)
```

[<matplotlib.lines.Line2D at 0x7fbaf06c0a30>]



x_val

```
array([-3.00000000e+00, -2.99000000e+00, -2.98000000e+00, -2.97000000e+00,
       -2.96000000e+00, -2.95000000e+00, -2.94000000e+00, -2.93000000e+00,
       -2.92000000e+00, -2.91000000e+00, -2.90000000e+00, -2.89000000e+00,
       -2.88000000e+00, -2.87000000e+00, -2.86000000e+00, -2.85000000e+00,
       -2.84000000e+00, -2.83000000e+00, -2.82000000e+00, -2.81000000e+00,
       -2.80000000e+00, -2.79000000e+00, -2.78000000e+00, -2.77000000e+00,
       -2.76000000e+00, -2.75000000e+00, -2.74000000e+00, -2.73000000e+00,
       -2.72000000e+00, -2.71000000e+00, -2.70000000e+00, -2.69000000e+00,
       -2.68000000e+00, -2.67000000e+00, -2.66000000e+00, -2.65000000e+00,
       -2.64000000e+00, -2.63000000e+00, -2.62000000e+00, -2.61000000e+00,
```

```
-2.60000000e+00, -2.59000000e+00, -2.58000000e+00, -2.57000000e+00,  
-2.56000000e+00, -2.55000000e+00, -2.54000000e+00, -2.53000000e+00,  
-2.52000000e+00, -2.51000000e+00, -2.50000000e+00, -2.49000000e+00,  
-2.48000000e+00, -2.47000000e+00, -2.46000000e+00, -2.45000000e+00,  
-2.44000000e+00, -2.43000000e+00, -2.42000000e+00, -2.41000000e+00,  
-2.40000000e+00, -2.39000000e+00, -2.38000000e+00, -2.37000000e+00,  
-2.36000000e+00, -2.35000000e+00, -2.34000000e+00, -2.33000000e+00,  
-2.32000000e+00, -2.31000000e+00, -2.30000000e+00, -2.29000000e+00,  
-2.28000000e+00, -2.27000000e+00, -2.26000000e+00, -2.25000000e+00,  
-2.24000000e+00, -2.23000000e+00, -2.22000000e+00, -2.21000000e+00,  
-2.20000000e+00, -2.19000000e+00, -2.18000000e+00, -2.17000000e+00,  
-2.16000000e+00, -2.15000000e+00, -2.14000000e+00, -2.13000000e+00,  
-2.12000000e+00, -2.11000000e+00, -2.10000000e+00, -2.09000000e+00,  
-2.08000000e+00, -2.07000000e+00, -2.06000000e+00, -2.05000000e+00,  
-2.04000000e+00, -2.03000000e+00, -2.02000000e+00, -2.01000000e+00,  
-2.00000000e+00, -1.99000000e+00, -1.98000000e+00, -1.97000000e+00,  
-1.96000000e+00, -1.95000000e+00, -1.94000000e+00, -1.93000000e+00,  
-1.92000000e+00, -1.91000000e+00, -1.90000000e+00, -1.89000000e+00,  
-1.88000000e+00, -1.87000000e+00, -1.86000000e+00, -1.85000000e+00,  
-1.84000000e+00, -1.83000000e+00, -1.82000000e+00, -1.81000000e+00,  
-1.80000000e+00, -1.79000000e+00, -1.78000000e+00, -1.77000000e+00,  
-1.76000000e+00, -1.75000000e+00, -1.74000000e+00, -1.73000000e+00,  
-1.72000000e+00, -1.71000000e+00, -1.70000000e+00, -1.69000000e+00,  
-1.68000000e+00, -1.67000000e+00, -1.66000000e+00, -1.65000000e+00,  
-1.64000000e+00, -1.63000000e+00, -1.62000000e+00, -1.61000000e+00,  
-1.60000000e+00, -1.59000000e+00, -1.58000000e+00, -1.57000000e+00,  
-1.56000000e+00, -1.55000000e+00, -1.54000000e+00, -1.53000000e+00,  
-1.52000000e+00, -1.51000000e+00, -1.50000000e+00, -1.49000000e+00,  
-1.48000000e+00, -1.47000000e+00, -1.46000000e+00, -1.45000000e+00,  
-1.44000000e+00, -1.43000000e+00, -1.42000000e+00, -1.41000000e+00,  
-1.40000000e+00, -1.39000000e+00, -1.38000000e+00, -1.37000000e+00,  
-1.36000000e+00, -1.35000000e+00, -1.34000000e+00, -1.33000000e+00,  
-1.32000000e+00, -1.31000000e+00, -1.30000000e+00, -1.29000000e+00,  
-1.28000000e+00, -1.27000000e+00, -1.26000000e+00, -1.25000000e+00,  
-1.24000000e+00, -1.23000000e+00, -1.22000000e+00, -1.21000000e+00,  
-1.20000000e+00, -1.19000000e+00, -1.18000000e+00, -1.17000000e+00,  
-1.16000000e+00, -1.15000000e+00, -1.14000000e+00, -1.13000000e+00,  
-1.12000000e+00, -1.11000000e+00, -1.10000000e+00, -1.09000000e+00,  
-1.08000000e+00, -1.07000000e+00, -1.06000000e+00, -1.05000000e+00,  
-1.04000000e+00, -1.03000000e+00, -1.02000000e+00, -1.01000000e+00,  
-1.00000000e+00, -9.90000000e-01, -9.80000000e-01, -9.70000000e-01,  
-9.60000000e-01, -9.50000000e-01, -9.40000000e-01, -9.30000000e-01,  
-9.20000000e-01, -9.10000000e-01, -9.00000000e-01, -8.90000000e-01,  
-8.80000000e-01, -8.70000000e-01, -8.60000000e-01, -8.50000000e-01,  
-8.40000000e-01, -8.30000000e-01, -8.20000000e-01, -8.10000000e-01,  
-8.00000000e-01, -7.90000000e-01, -7.80000000e-01, -7.70000000e-01,  
-7.60000000e-01, -7.50000000e-01, -7.40000000e-01, -7.30000000e-01,  
-7.20000000e-01, -7.10000000e-01, -7.00000000e-01, -6.90000000e-01,
```

y_val

```
array([9.00000000e+00, 8.94010000e+00, 8.88040000e+00, 8.82090000e+00,  
      8.76160000e+00, 8.70250000e+00, 8.64360000e+00, 8.58490000e+00,  
      8.52640000e+00, 8.46810000e+00, 8.41000000e+00, 8.35210000e+00,  
      8.29440000e+00, 8.23690000e+00, 8.17960000e+00, 8.12250000e+00,  
      8.06560000e+00, 8.00890000e+00, 7.95240000e+00, 7.89610000e+00,  
      7.84000000e+00, 7.78410000e+00, 7.72840000e+00, 7.67290000e+00,  
      7.61760000e+00, 7.56250000e+00, 7.50760000e+00, 7.45290000e+00,  
      7.39840000e+00, 7.34410000e+00, 7.29000000e+00, 7.23610000e+00,  
      7.18240000e+00, 7.12890000e+00, 7.07560000e+00, 7.02250000e+00,
```

```

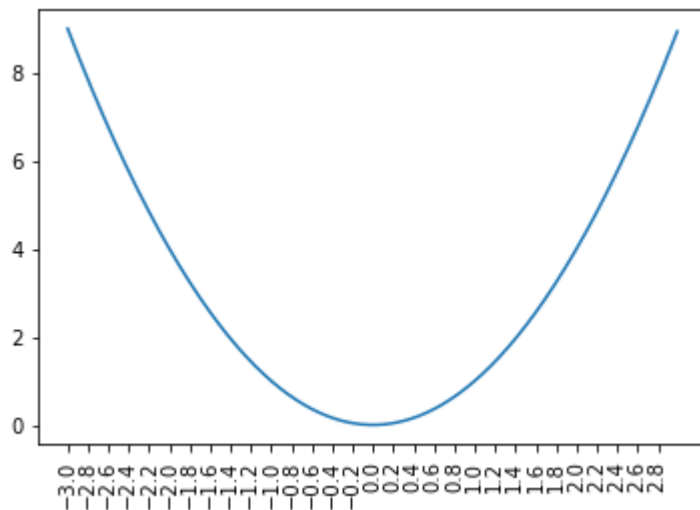
6.96960000e+00, 6.91690000e+00, 6.86440000e+00, 6.81210000e+00,
6.76000000e+00, 6.70810000e+00, 6.65640000e+00, 6.60490000e+00,
6.55360000e+00, 6.50250000e+00, 6.45160000e+00, 6.40090000e+00,
6.35040000e+00, 6.30010000e+00, 6.25000000e+00, 6.20010000e+00,
6.15040000e+00, 6.10090000e+00, 6.05160000e+00, 6.00250000e+00,
5.95360000e+00, 5.90490000e+00, 5.85640000e+00, 5.80810000e+00,
5.76000000e+00, 5.71210000e+00, 5.66440000e+00, 5.61690000e+00,
5.56960000e+00, 5.52250000e+00, 5.47560000e+00, 5.42890000e+00,
5.38240000e+00, 5.33610000e+00, 5.29000000e+00, 5.24410000e+00,
5.19840000e+00, 5.15290000e+00, 5.10760000e+00, 5.06250000e+00,
5.01760000e+00, 4.97290000e+00, 4.92840000e+00, 4.88410000e+00,
4.84000000e+00, 4.79610000e+00, 4.75240000e+00, 4.70890000e+00,
4.66560000e+00, 4.62250000e+00, 4.57960000e+00, 4.53690000e+00,
4.49440000e+00, 4.45210000e+00, 4.41000000e+00, 4.36810000e+00,
4.32640000e+00, 4.28490000e+00, 4.24360000e+00, 4.20250000e+00,
4.16160000e+00, 4.12090000e+00, 4.08040000e+00, 4.04010000e+00,
4.00000000e+00, 3.96010000e+00, 3.92040000e+00, 3.88090000e+00,
3.84160000e+00, 3.80250000e+00, 3.76360000e+00, 3.72490000e+00,
3.68640000e+00, 3.64810000e+00, 3.61000000e+00, 3.57210000e+00,
3.53440000e+00, 3.49690000e+00, 3.45960000e+00, 3.42250000e+00,
3.38560000e+00, 3.34890000e+00, 3.31240000e+00, 3.27610000e+00,
3.24000000e+00, 3.20410000e+00, 3.16840000e+00, 3.13290000e+00,
3.09760000e+00, 3.06250000e+00, 3.02760000e+00, 2.99290000e+00,
2.95840000e+00, 2.92410000e+00, 2.89000000e+00, 2.85610000e+00,
2.82240000e+00, 2.78890000e+00, 2.75560000e+00, 2.72250000e+00,
2.68960000e+00, 2.65690000e+00, 2.62440000e+00, 2.59210000e+00,
2.56000000e+00, 2.52810000e+00, 2.49640000e+00, 2.46490000e+00,
2.43360000e+00, 2.40250000e+00, 2.37160000e+00, 2.34090000e+00,
2.31040000e+00, 2.28010000e+00, 2.25000000e+00, 2.22010000e+00,
2.19040000e+00, 2.16090000e+00, 2.13160000e+00, 2.10250000e+00,
2.07360000e+00, 2.04490000e+00, 2.01640000e+00, 1.98810000e+00,
1.96000000e+00, 1.93210000e+00, 1.90440000e+00, 1.87690000e+00,
1.84960000e+00, 1.82250000e+00, 1.79560000e+00, 1.76890000e+00,
1.74240000e+00, 1.71610000e+00, 1.69000000e+00, 1.66410000e+00,
1.63840000e+00, 1.61290000e+00, 1.58760000e+00, 1.56250000e+00,
1.53760000e+00, 1.51290000e+00, 1.48840000e+00, 1.46410000e+00,
1.44000000e+00, 1.41610000e+00, 1.39240000e+00, 1.36890000e+00,
1.34560000e+00, 1.32250000e+00, 1.29960000e+00, 1.27690000e+00,
1.25440000e+00, 1.23210000e+00, 1.21000000e+00, 1.18810000e+00,
1.16640000e+00, 1.14490000e+00, 1.12360000e+00, 1.10250000e+00,
1.08160000e+00, 1.06090000e+00, 1.04040000e+00, 1.02010000e+00,
1.00000000e+00, 9.80100000e-01, 9.60400000e-01, 9.40900000e-01,
9.21600000e-01, 9.02500000e-01, 8.83600000e-01, 8.64900000e-01,
8.46400000e-01, 8.28100000e-01, 8.10000000e-01, 7.92100000e-01,
7.74400000e-01, 7.56900000e-01, 7.39600000e-01, 7.22500000e-01,
7.05600000e-01, 6.88900000e-01, 6.72400000e-01, 6.56100000e-01,
6.40000000e-01, 6.24100000e-01, 6.08400000e-01, 5.92900000e-01,
5.77600000e-01, 5.62500000e-01, 5.47600000e-01, 5.32900000e-01,
5.18400000e-01, 5.04100000e-01, 4.90000000e-01, 4.76100000e-01.

```

```

x_val=np.arange(-3,3,0.01)
y_val=x_val**2
plt.plot(x_val,y_val)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.show()

```



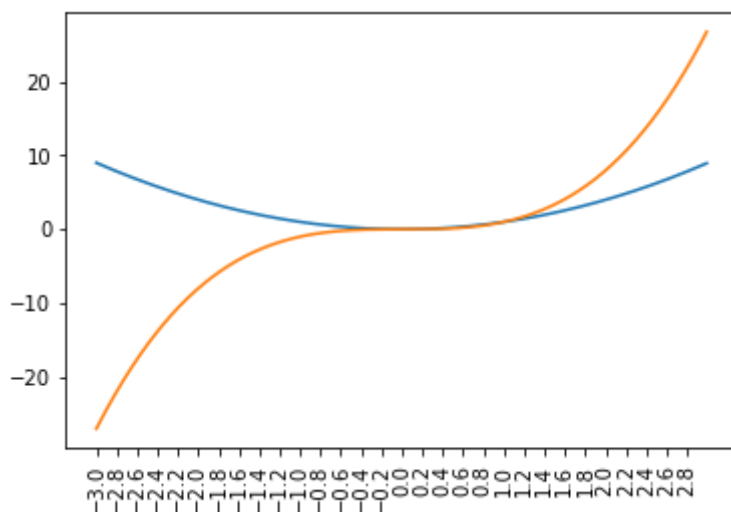
```
x_val=np.arange(-3,3,0.01)
y_val=x_val**2
plt.plot(x_val,y_val)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.show()
```

```
x_val1=np.arange(-3,3,0.01)
y_val1=x_val**3
plt.plot(x_val1,y_val1)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.show()
```

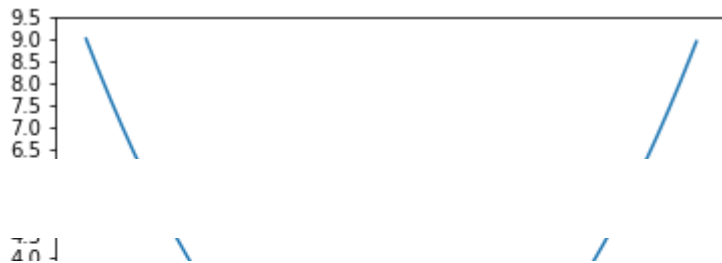


```
x=np.arange(-3,3,0.01)
y=x_val**2
plt.plot(x,y)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
```

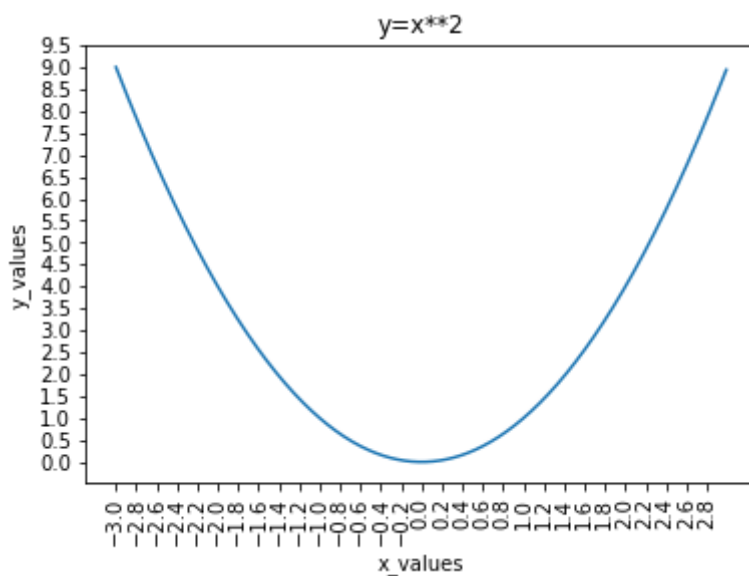
```
y1=x_val**3
plt.plot(x,y1)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.show()
```



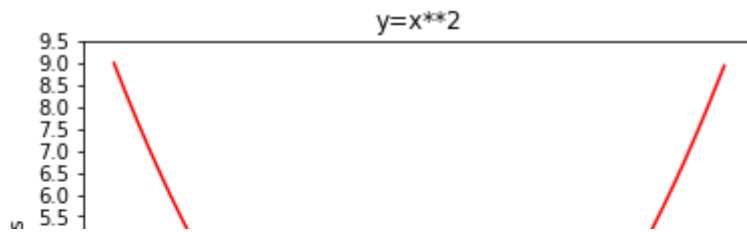
```
x=np.arange(-3,3,0.01)
y=x**2
plt.plot(x,y)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.show()
```



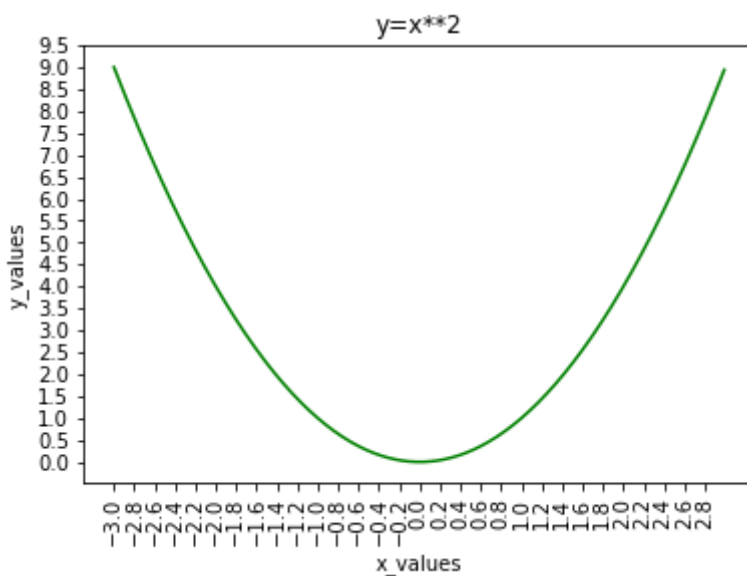
```
x=np.arange(-3,3,0.01)
y=x**2
plt.plot(x,y)
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



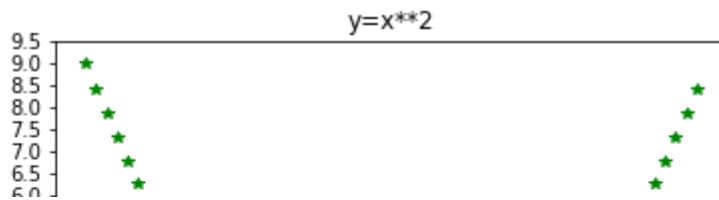
```
x=np.arange(-3,3,0.01)
y=x**2
plt.plot(x,y,"r")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```

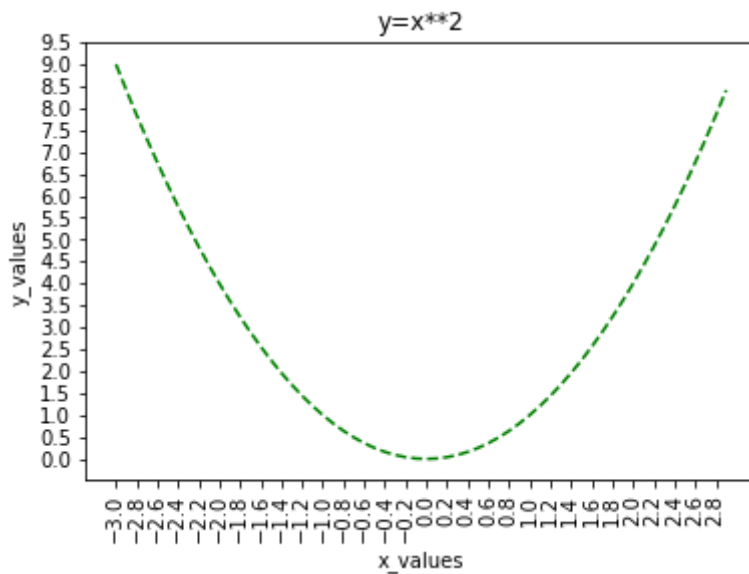
```
x=np.arange(-3,3,0.01)
y=x**2
plt.plot(x,y,"g")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



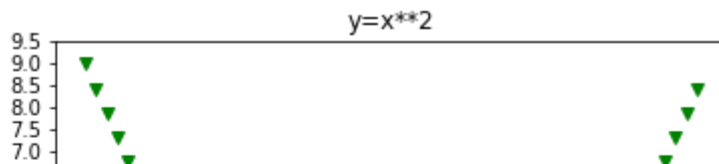
```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g*")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



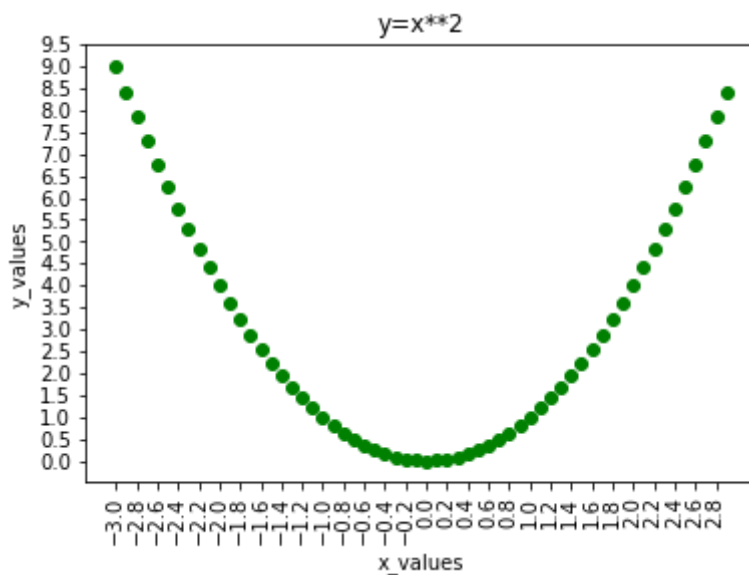
```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g--")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



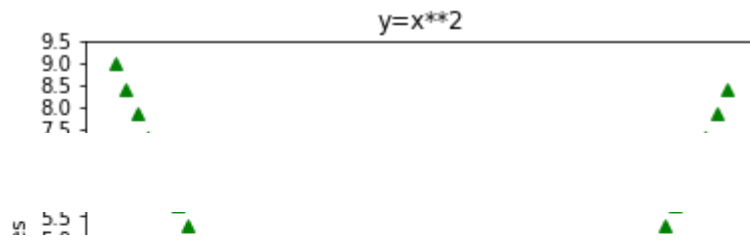
```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"gv")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



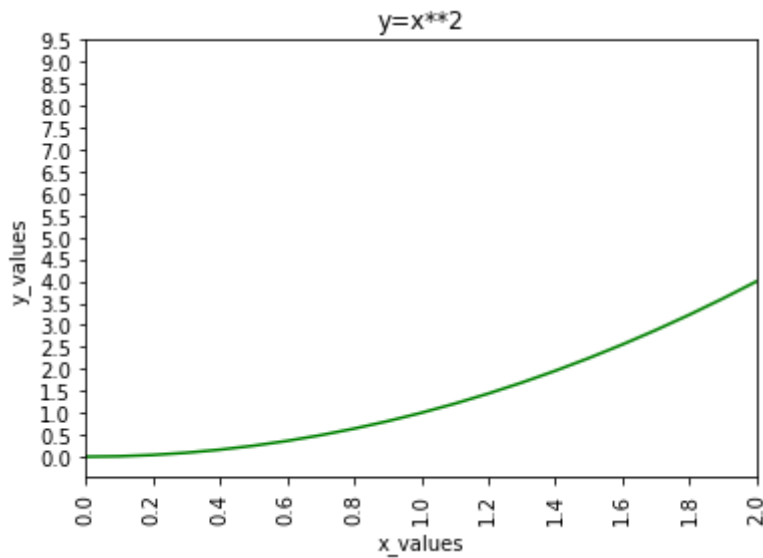
```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"go")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



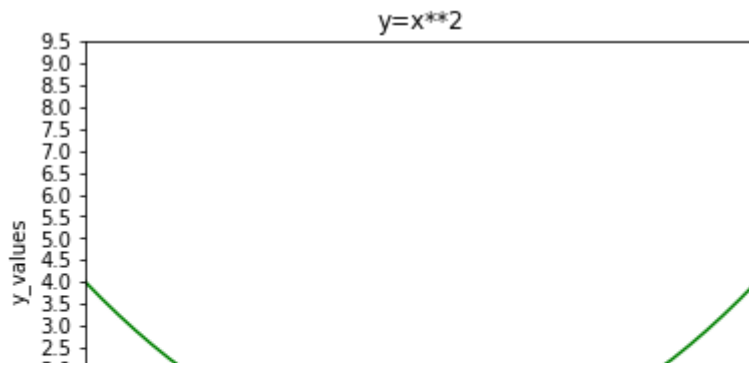
```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g^")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.show()
```



```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.xlim(left=0,right=2)
plt.show()
```

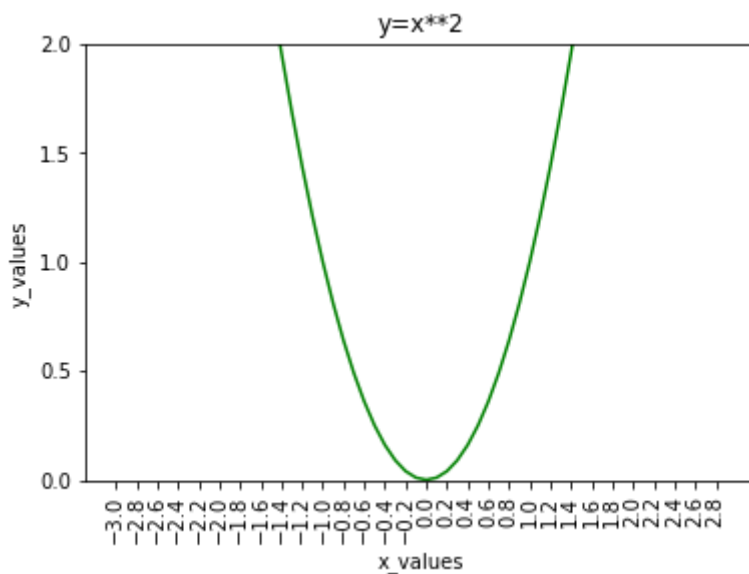


```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.xlim(left=0,right=2)
plt.show()
```

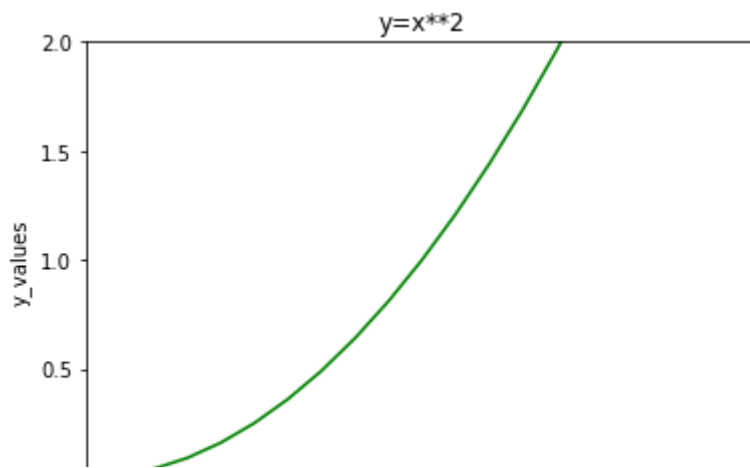


```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')

plt.ylim(bottom=0,top=2)
plt.show()
```

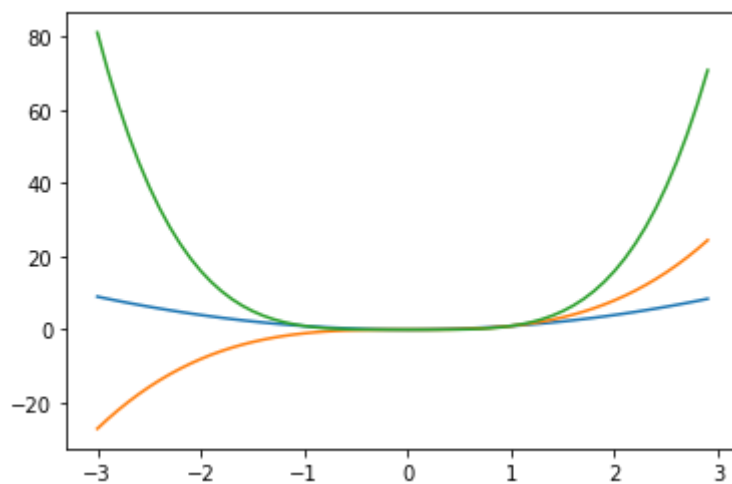


```
x=np.arange(-3,3,0.1)
y=x**2
plt.plot(x,y,"g")
plt.xticks(np.arange(-3,3,0.2),rotation=90)
plt.yticks(np.arange(0,10,0.5))
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.xlim(left=0,right=2)
plt.ylim(bottom=0,top=2)
plt.show()
```



```
x=np.arange(-3,3,0.1)
y=x**2
y1=x**3
y2=x**4
plt.plot(x,y)
plt.plot(x,y1)
plt.plot(x,y2)

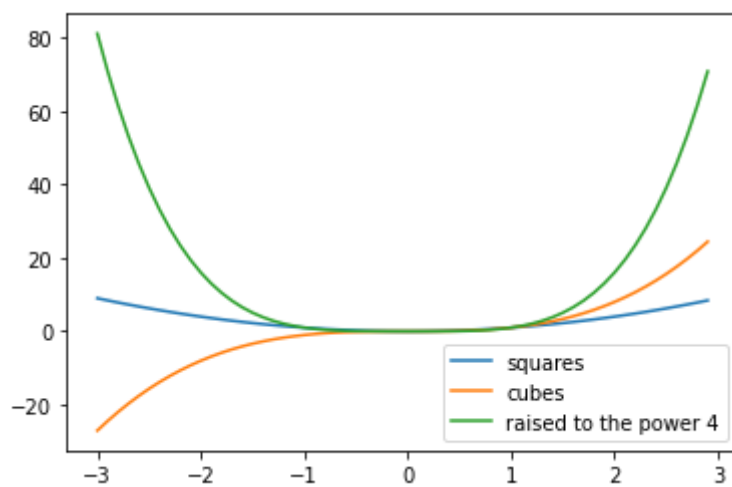
plt.show()
```






```
x=np.arange(-3,3,0.1)
y=x**2
y1=x**3
y2=x**4
plt.plot(x,y,label="squares")
plt.plot(x,y1,label="cubes")
plt.plot(x,y2,label="raised to the power 4")
plt.legend()
plt.show()
```

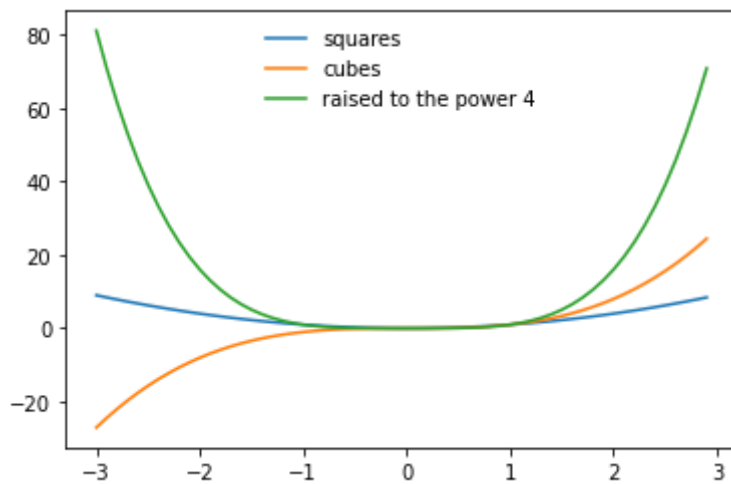


```
x=np.arange(-3,3,0.1)
y=x**2
y1=x**3
y2=x**4
plt.plot(x,y)
plt.plot(x,y1)
plt.plot(x,y2)
plt.legend(["squares","cubes","raised to the power 4"])
plt.show()
```

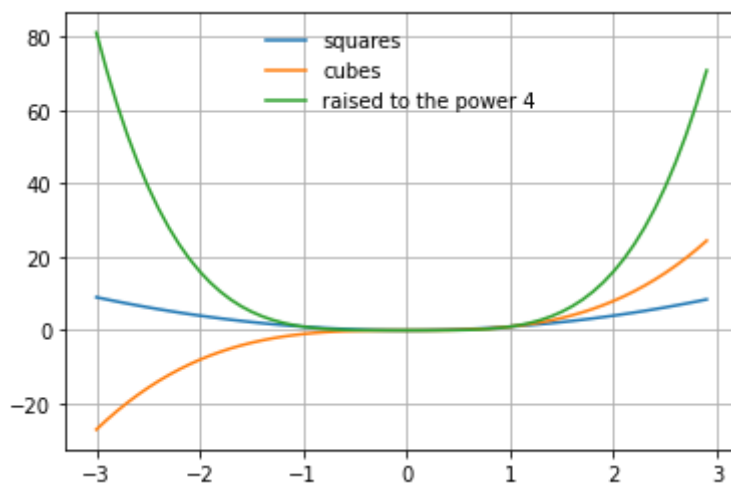


```
x=np.arange(-3,3,0.1)
y=x**2
y1=x**3
y2=x**4
plt.plot(x,y)
plt.plot(x,y1)
plt.plot(x,y2)
plt.legend(["squares","cubes","raised to the power 4"],loc="upper center")
plt.show()
```

```
on     
x=np.arange(-3,3,0.1)  
y=x**2  
y1=x**3  
y2=x**4  
plt.plot(x,y)  
plt.plot(x,y1)  
plt.plot(x,y2)  
plt.legend(["squares","cubes","raised to the power 4"],loc="upper center",frameon=False)  
plt.show()
```



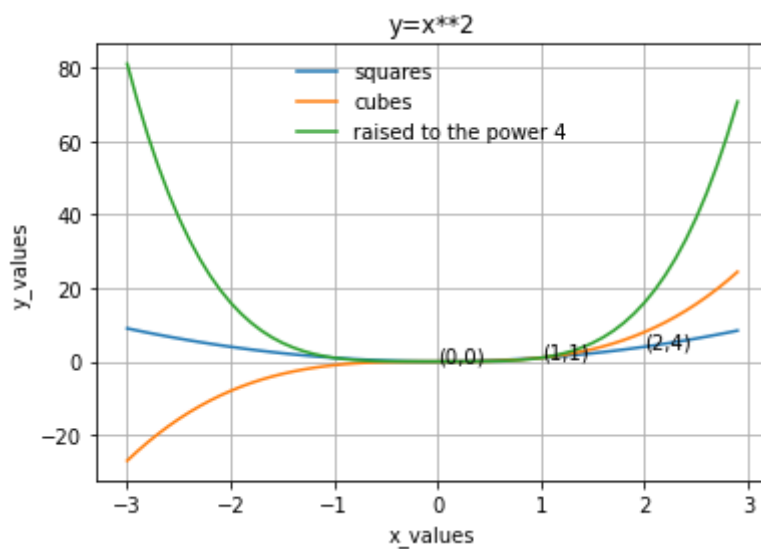
```
x=np.arange(-3,3,0.1)  
y=x**2  
y1=x**3  
y2=x**4  
plt.plot(x,y)  
plt.plot(x,y1)  
plt.plot(x,y2)  
plt.grid()  
plt.legend(["squares","cubes","raised to the power 4"],loc="upper center",frameon=False)  
plt.show()
```




```

x=np.arange(-3,3,0.1)
y=x**2
y1=x**3
y2=x**4
plt.plot(x,y)
plt.plot(x,y1)
plt.plot(x,y2)
plt.grid()
plt.text(0,0,"(0,0)")
plt.text(1,1,"(1,1)")
plt.text(2,4,"(2,4)")
plt.title("y=x**2")
plt.xlabel('x_values')
plt.ylabel('y_values')
plt.legend(["squares","cubes","raised to the power 4"],loc="upper center",frameon=False)
plt.show()

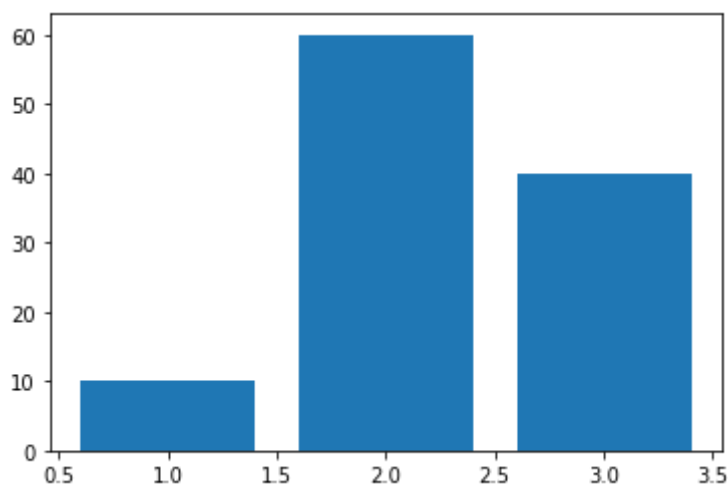
```



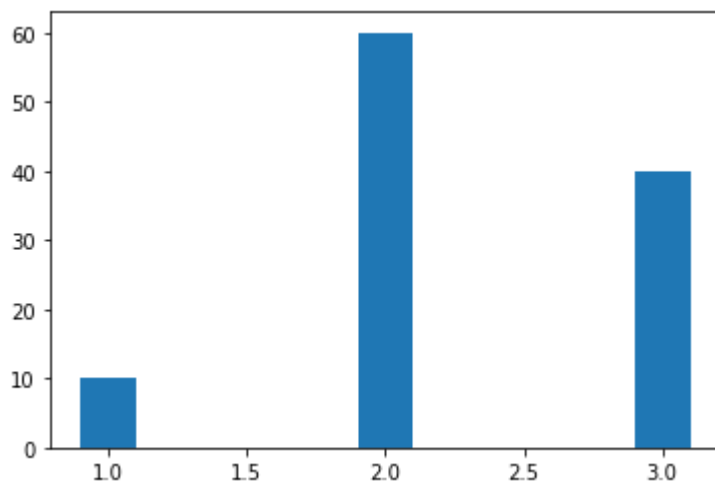
```

fruits=[1,2,3]
prices=[10,60,40]
plt.bar(fruits,prices)
plt.show()

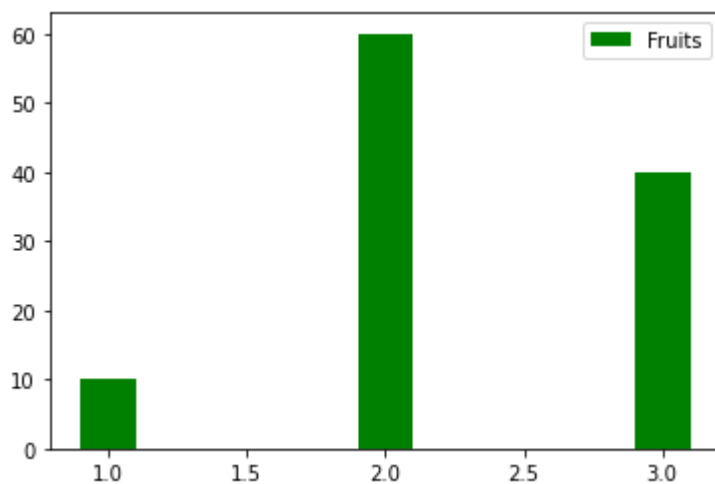
```



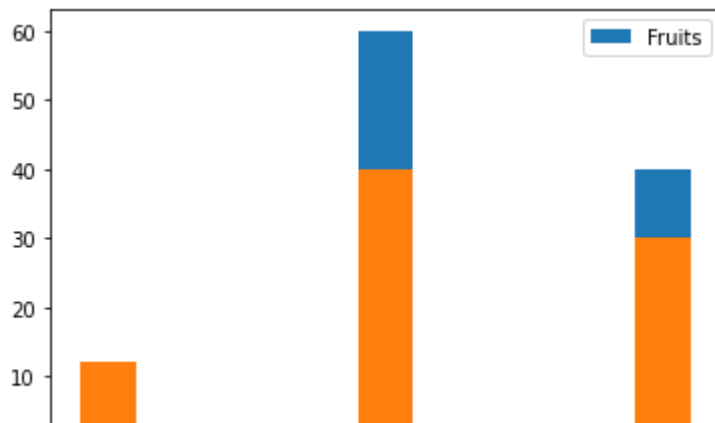
```
fruits=[1,2,3]
prices=[10,60,40]
plt.bar(fruits,prices,width=0.2)
plt.show()
```



```
fruits=[1,2,3]
prices=[10,60,40]
plt.bar(fruits,prices,width=0.2,color="g")
plt.legend(["Fruits"])
plt.show()
```

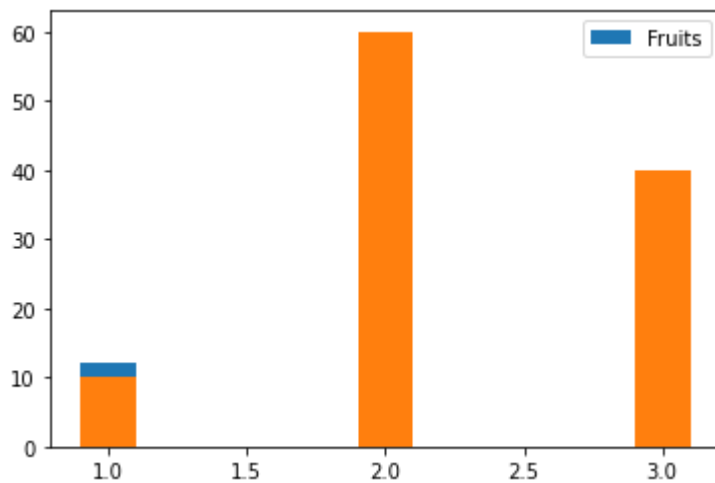


```
fruits=[1,2,3]
market1=[10,60,40]
market2=[12,40,30]
plt.bar(fruits,market1,width=0.2)
plt.bar(fruits,market2,width=0.2)
plt.legend(["Fruits"])
plt.show()
```



```
fruits=[1,2,3]
market1=[10,60,40]
market2=[12,40,30]
plt.bar(fruits,market2,width=0.2)
plt.bar(fruits,market1,width=0.2)

plt.legend(["Fruits"])
plt.show()
```



```
fruits=np.array([1,2,3])
market1=np.array([10,60,40])
market2=np.array([12,40,30])
plt.bar(fruits,market1,width=0.2)
plt.bar(fruits+0.2,market2,width=0.2)
plt.legend(["Market1","Market2"])
plt.show()
```



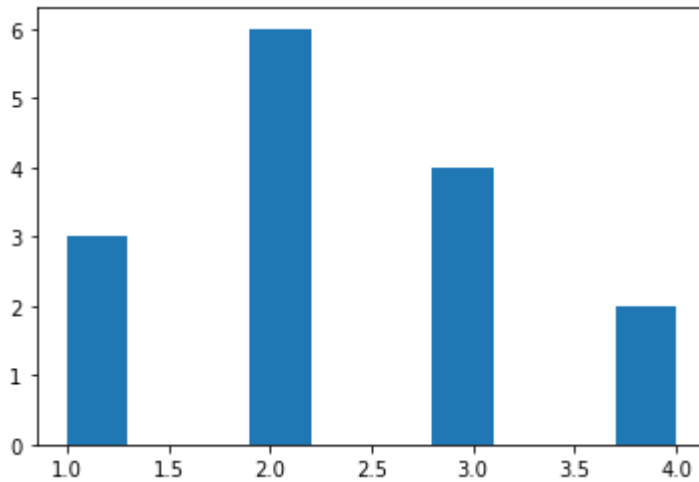
```
# plt.bar?
```



```
vals=[1,2,3,1,2,3,3,2,4,3,2,1,2,2,4]
```

```
plt.hist(vals)
```

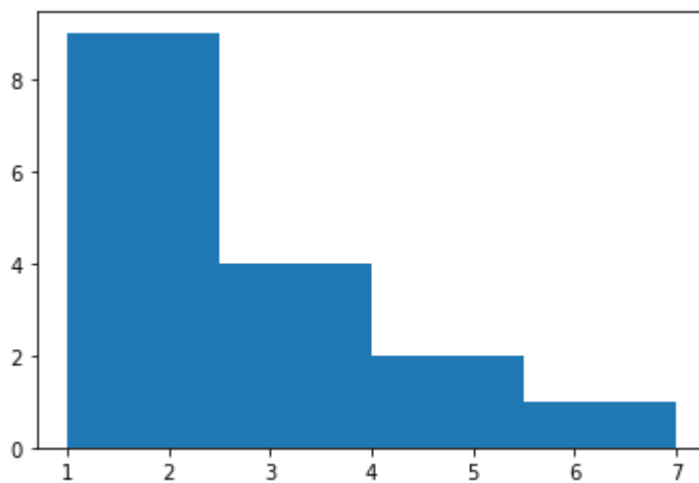
```
plt.show()
```



```
vals=[1,2,3,1,2,3,3,2,4,3,2,1,2,2,4,7]
```

```
plt.hist(vals,bins=4)
```

```
plt.show()
```



```
# plt.hist?
```

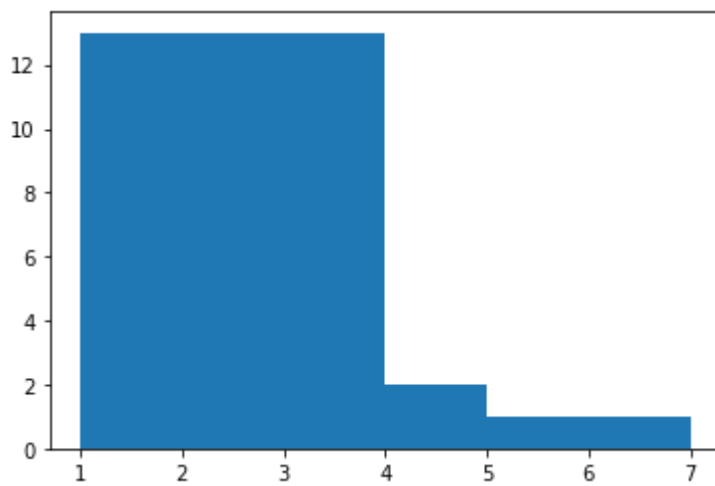
```
vals=[1,2,3,1,2,3,3,2,4,3,2,1,2,2,4,7]
```

```
plt.hist(vals,bins=[1,5,7])
```

```
plt.show()
```



```
vals=[1,2,3,1,2,3,3,2,4,3,2,1,2,2,4,7]  
plt.hist(vals,bins=[1,4,5,7])  
plt.show()
```



[Colab paid products](#) - [Cancel contracts here](#)

