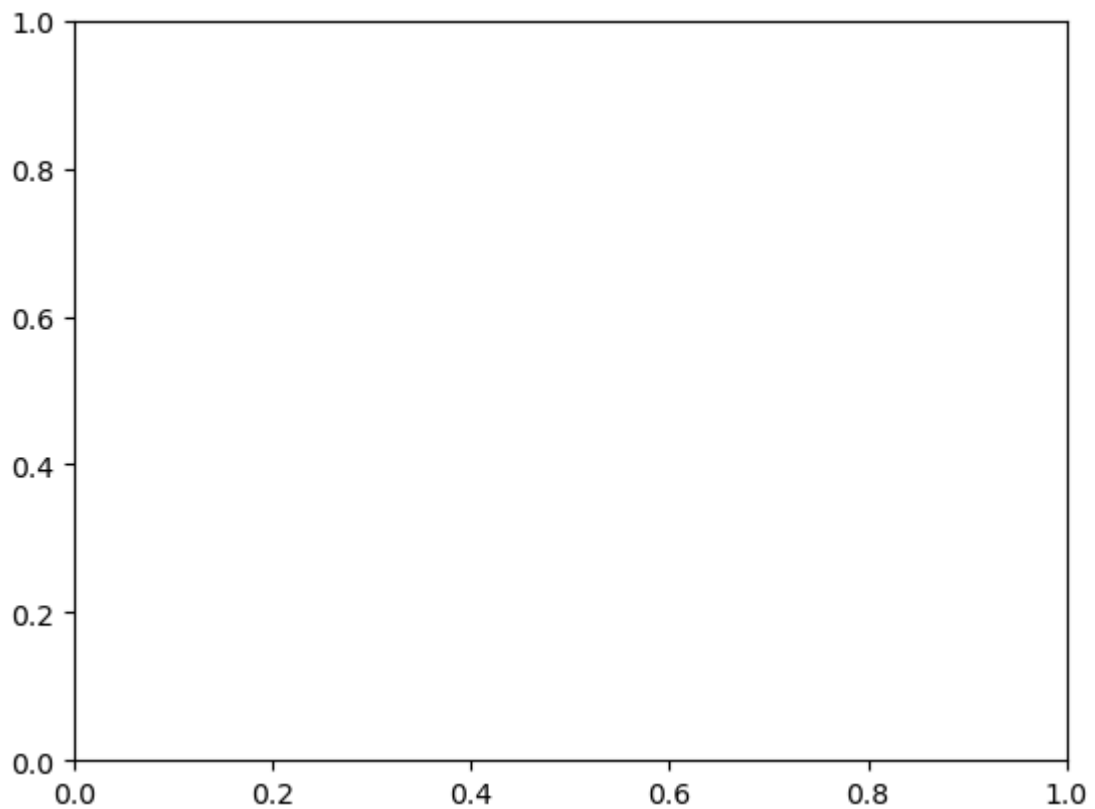
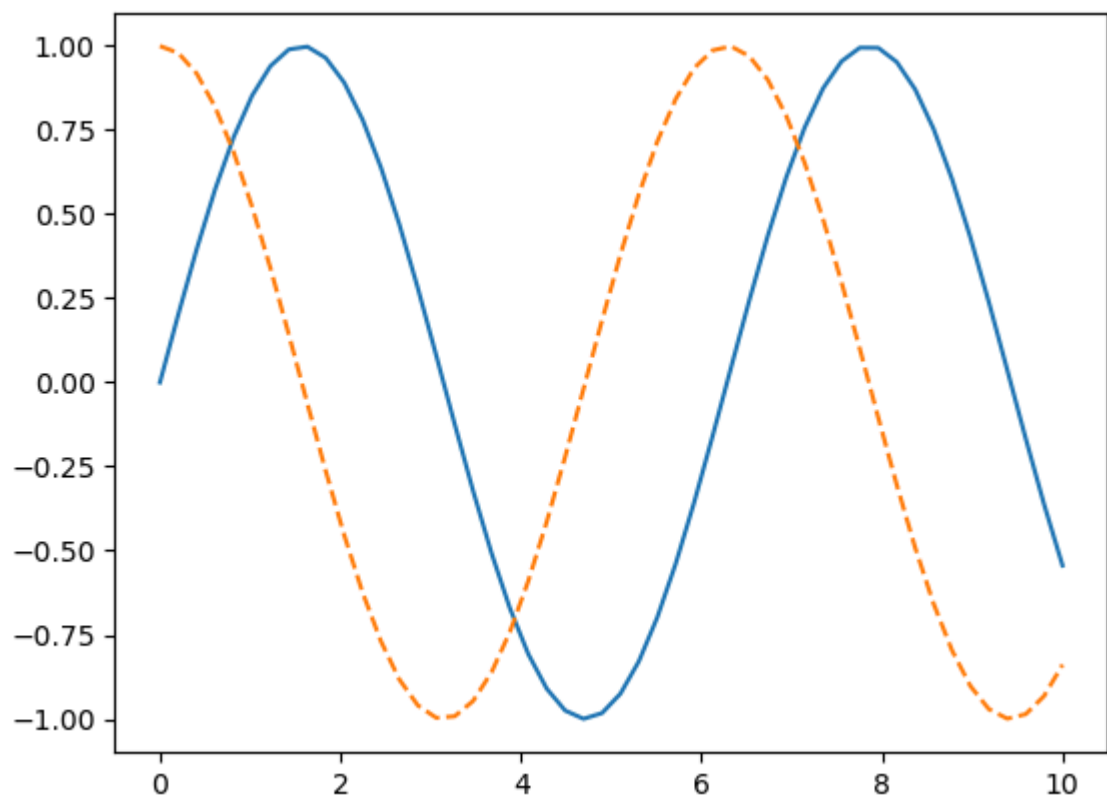
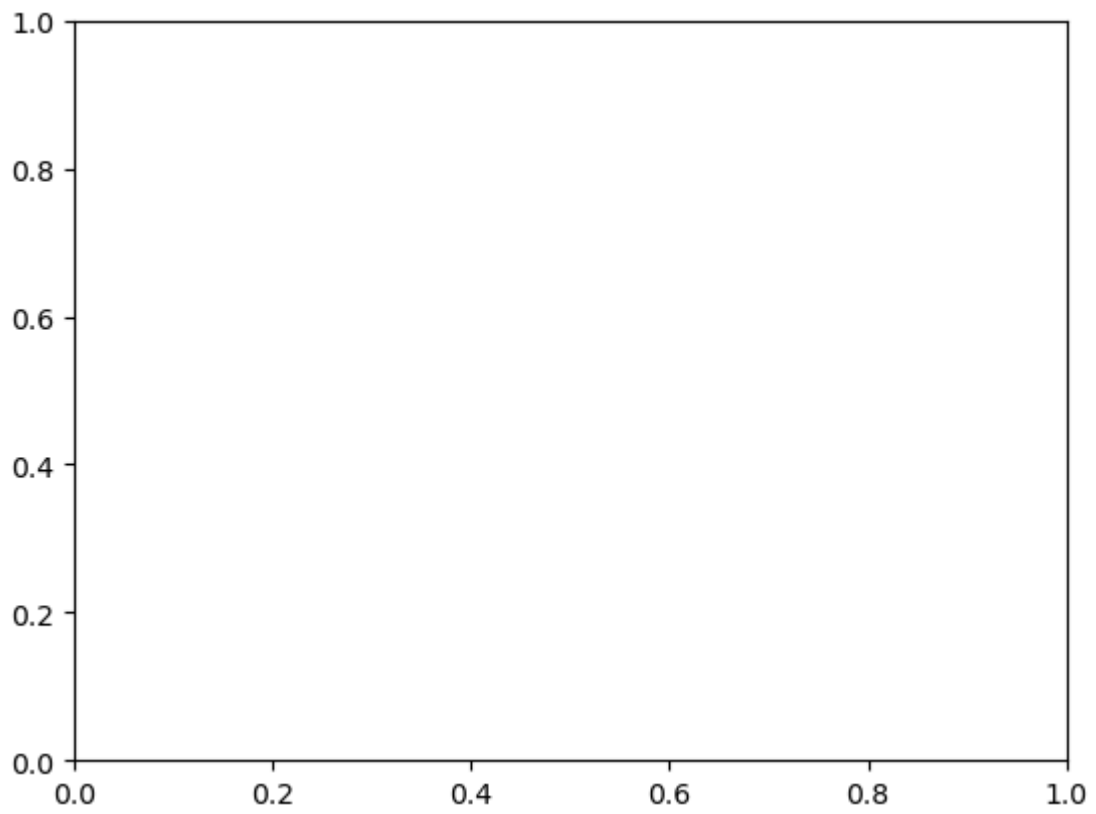


```
In [74]: import numpy as np  
import pandas as pd
```

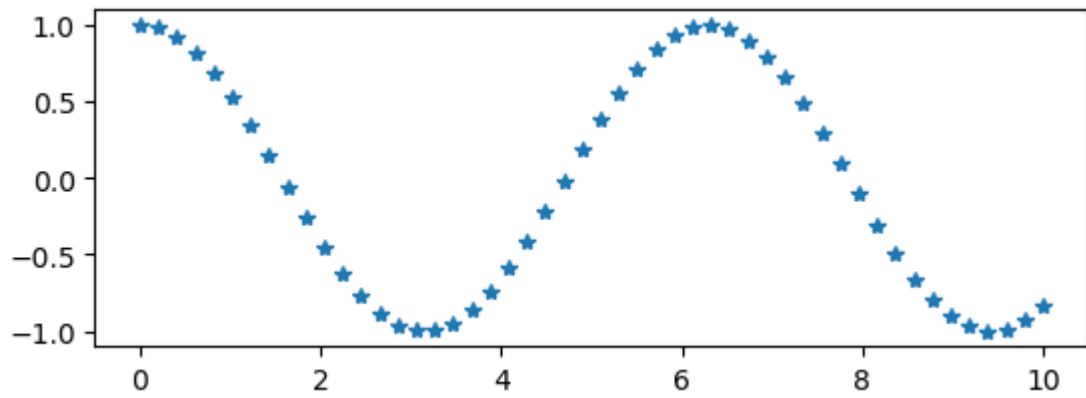
```
In [76]: import matplotlib.pyplot as plt
```

```
In [78]: %matplotlib inline  
x1=np.linspace(0,10,50)  
plt.plot(x1,np.sin(x1),'-')  
plt.plot(x1,np.cos(x1),'--')  
plt.show()
```

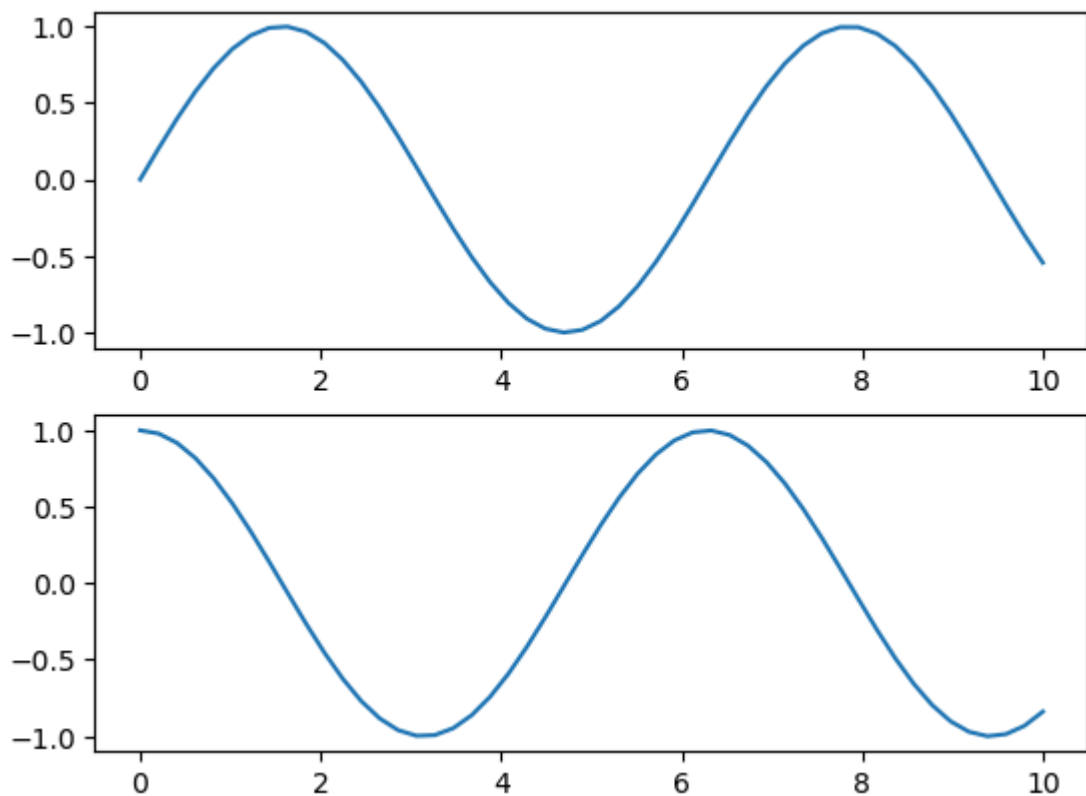




```
In [80]: plt.subplot(2,1,1)
plt.plot(x1,np.cos(x1),'*')
plt.show()
```



```
In [82]: plt.figure()
plt.subplot(2,1,1)
plt.plot(x1,np.sin(x1))
plt.subplot(2,1,2)
plt.plot(x1,np.cos(x1));
plt.show()
```

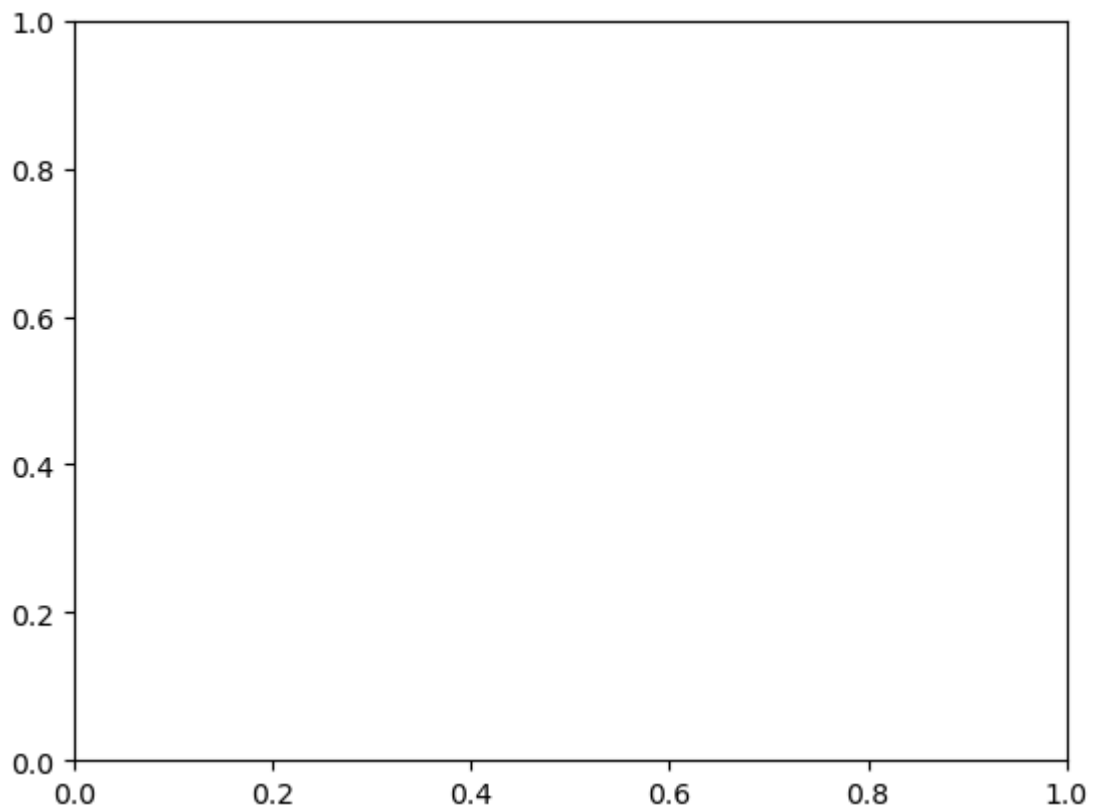


```
In [84]: print(plt.gcf())
plt.show()
```

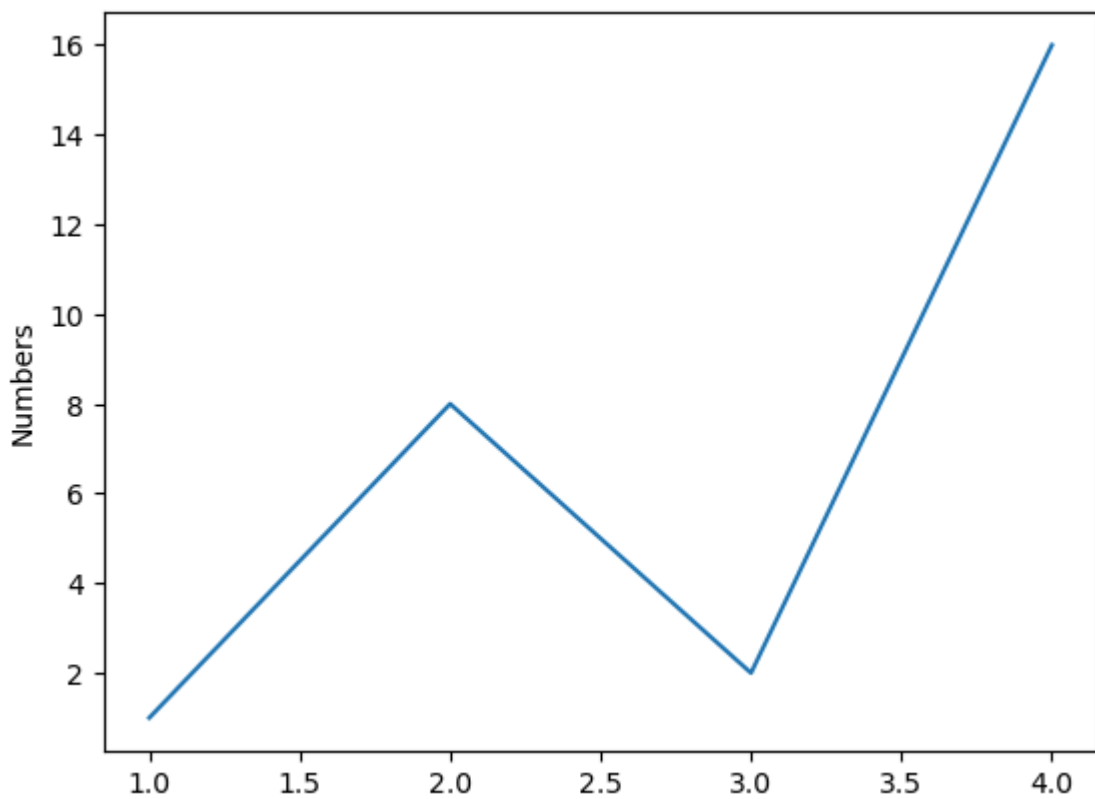
Figure(640x480)  
<Figure size 640x480 with 0 Axes>

```
In [86]: print(plt.gca())
plt.show()
```

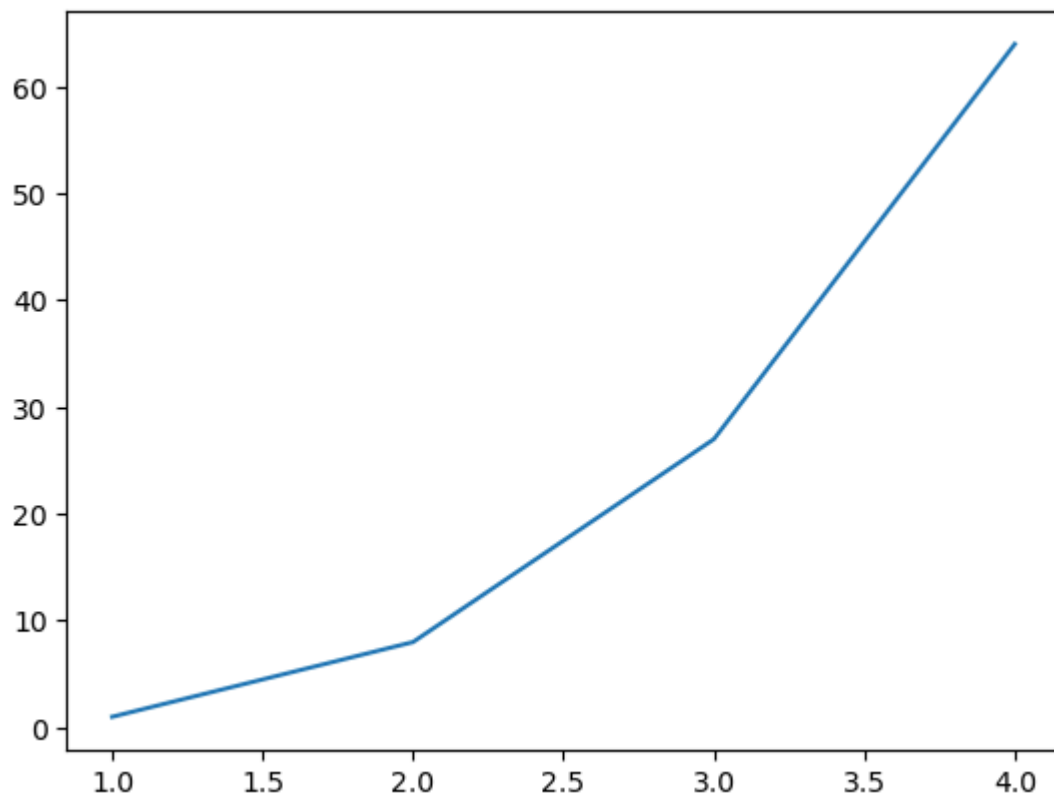
Axes(0.125,0.11;0.775x0.77)



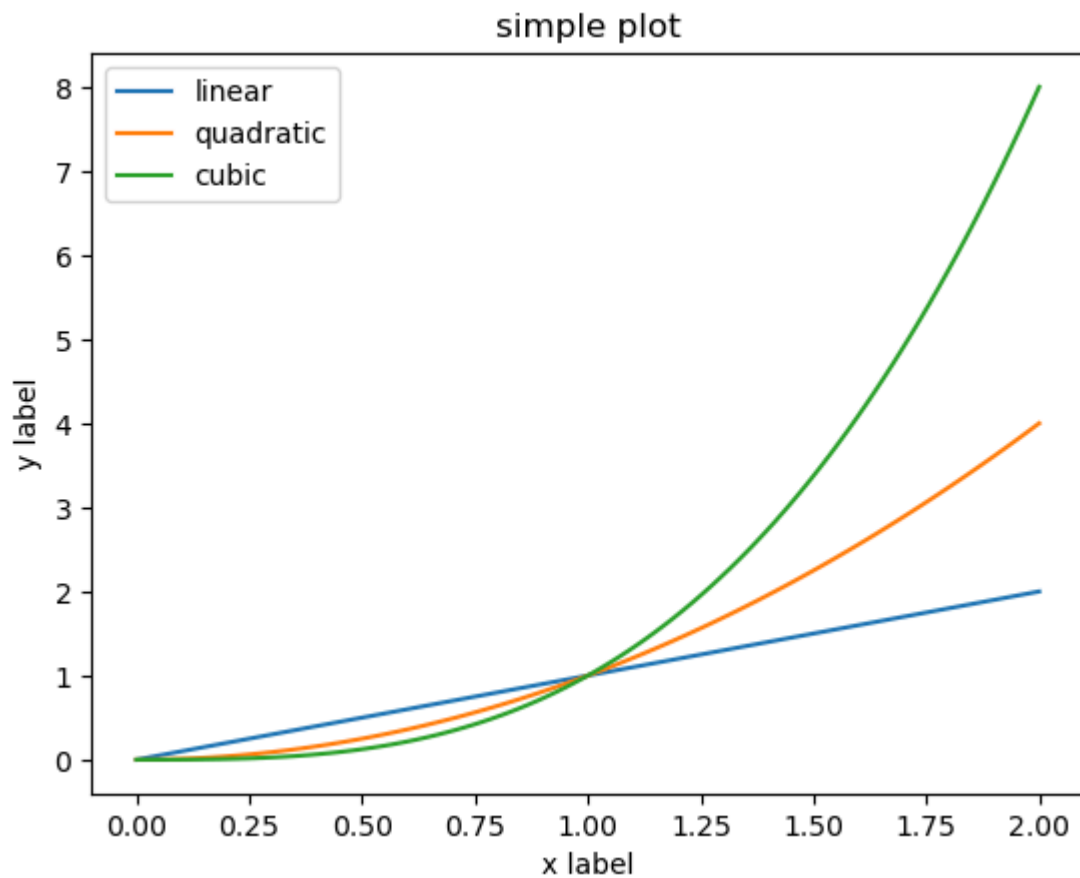
```
In [88]: plt.plot([1,2,3,4],[1,8,2,16])  
plt.ylabel('Numbers')  
plt.show()
```



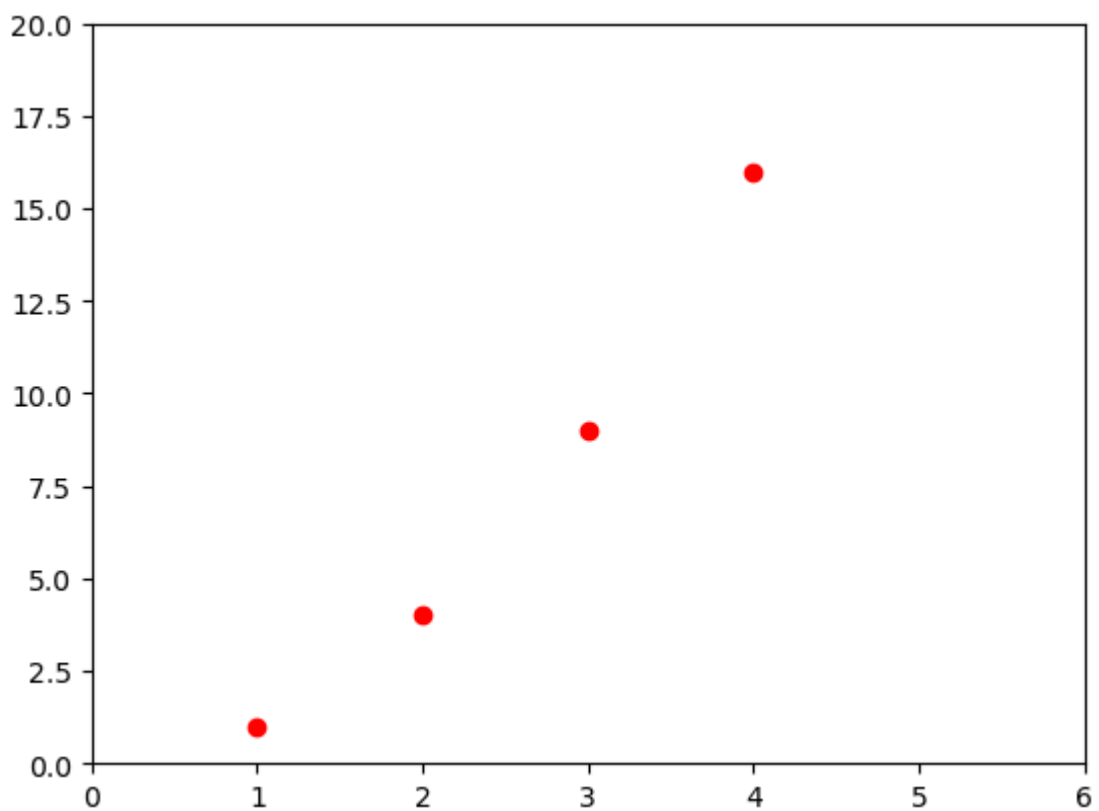
```
In [89]: import matplotlib.pyplot as plt  
plt.plot([1,2,3,4],[1,8,27,64])  
plt.show()
```



```
In [91]: x=np.linspace(0,2,100)
plt.plot(x,x,label='linear')
plt.plot(x,x**2,label='quadratic')
plt.plot(x,x**3,label='cubic')
plt.xlabel('x label')
plt.ylabel('y label')
plt.title('simple plot')
plt.legend()
plt.show()
```

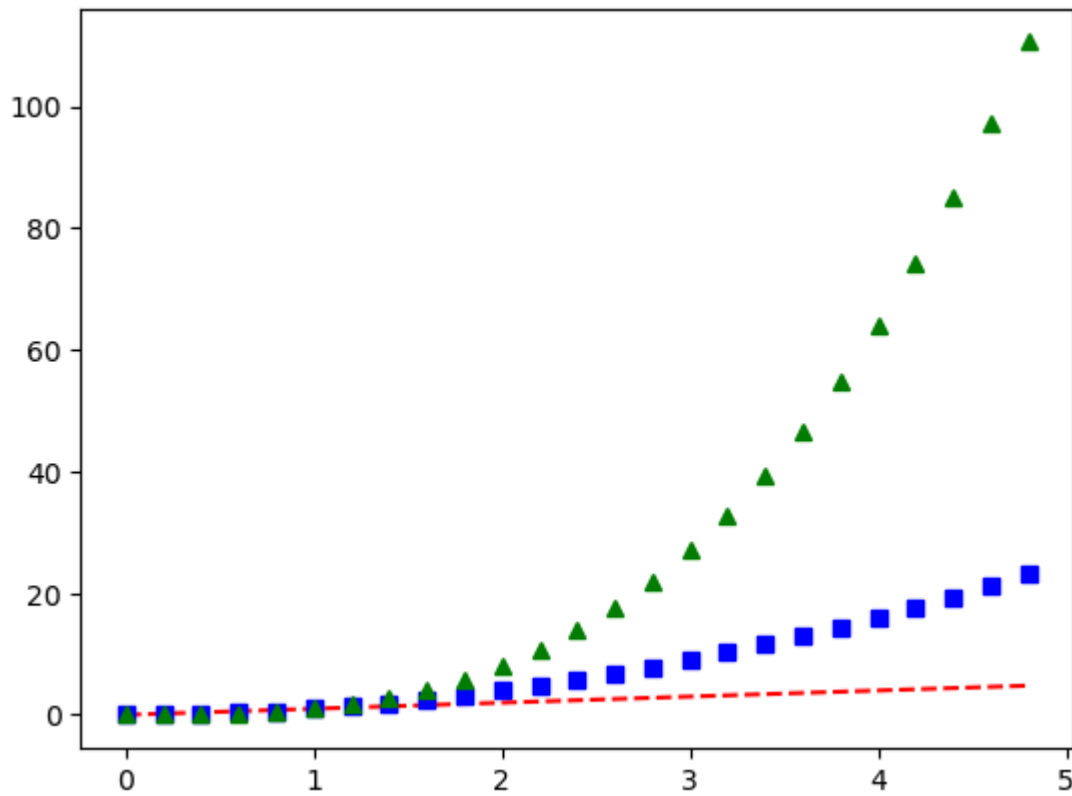


```
In [93]: plt.plot([1,2,3,4],[1,4,9,16], 'ro')  
plt.axis([0,6,0,20])  
plt.show()
```

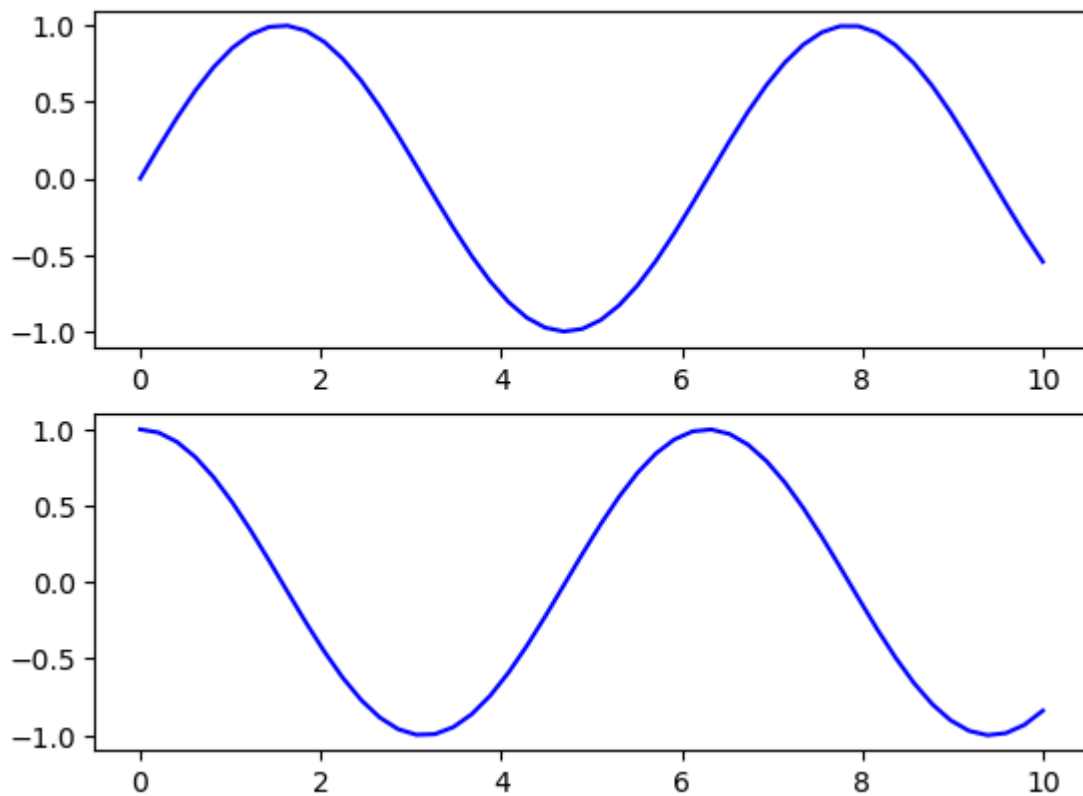


```
In [95]: t=np.arange(0.,5.,0.2)  
plt.plot(t,t, 'r--', t,t**2, 'bs', t,t**3, 'g^')
```

```
plt.show()
```

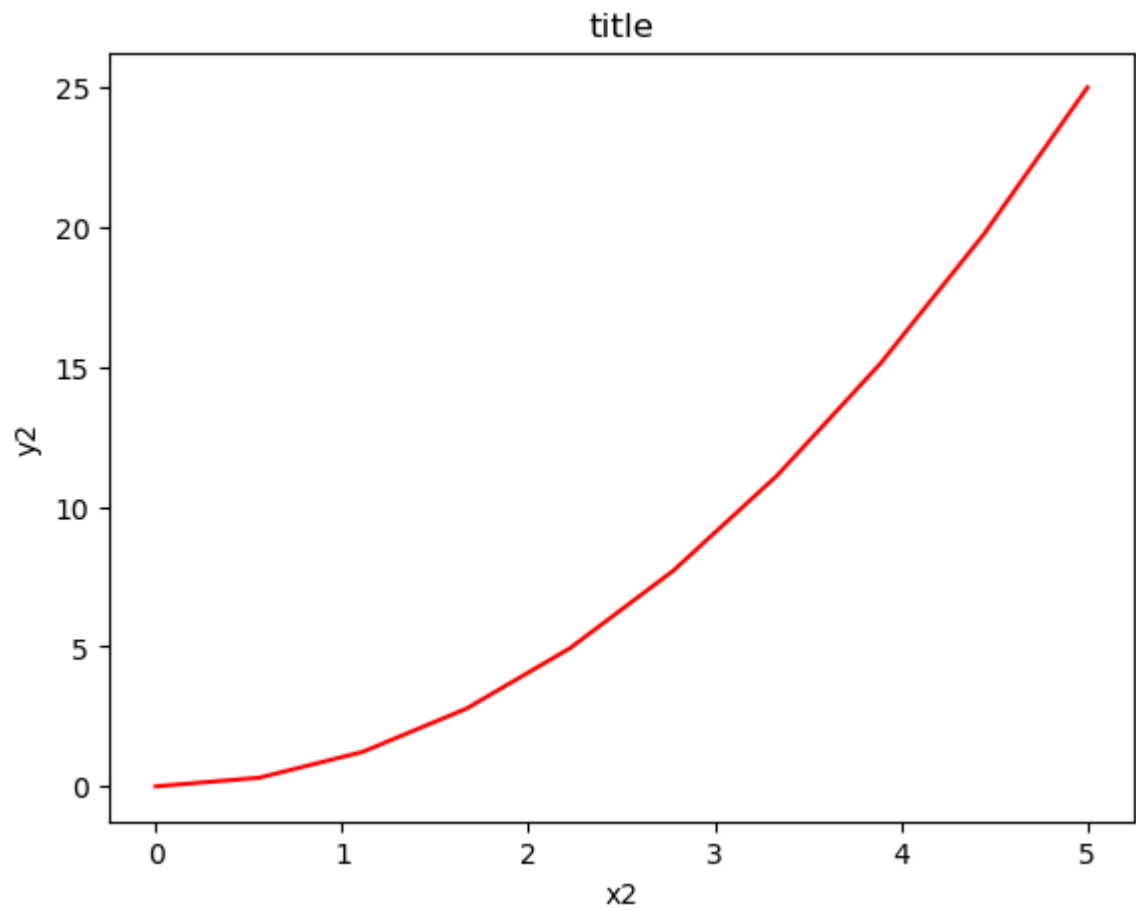


```
In [96]: fig,ax=plt.subplots(2)
ax[0].plot(x1,np.sin(x1),'b-')
ax[1].plot(x1,np.cos(x1),'b-');
plt.show()
```



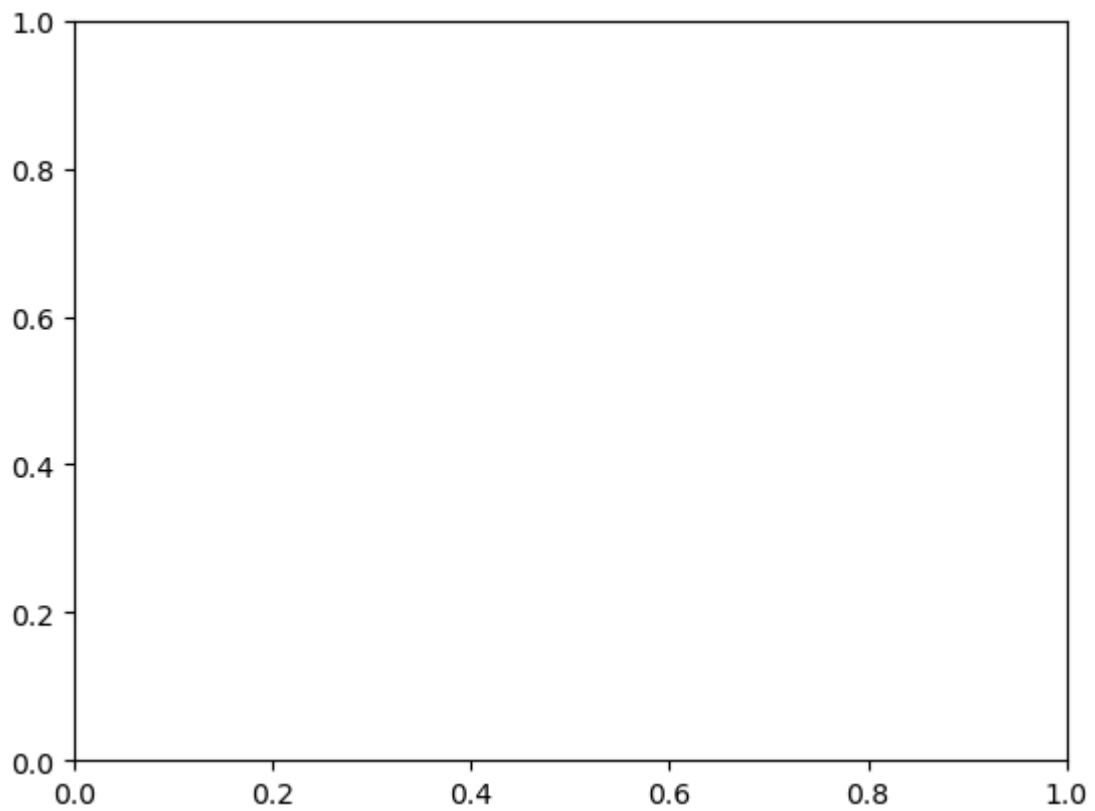
```
In [98]: fig=plt.figure()
x2=np.linspace(0,5,10)
y2=x2**2
```

```
axes=fig.add_axes([0.1,0.1,0.8,0.8])
axes.plot(x2,y2,'r')
axes.set_xlabel('x2')
axes.set_ylabel('y2')
axes.set_title('title');
plt.show()
```

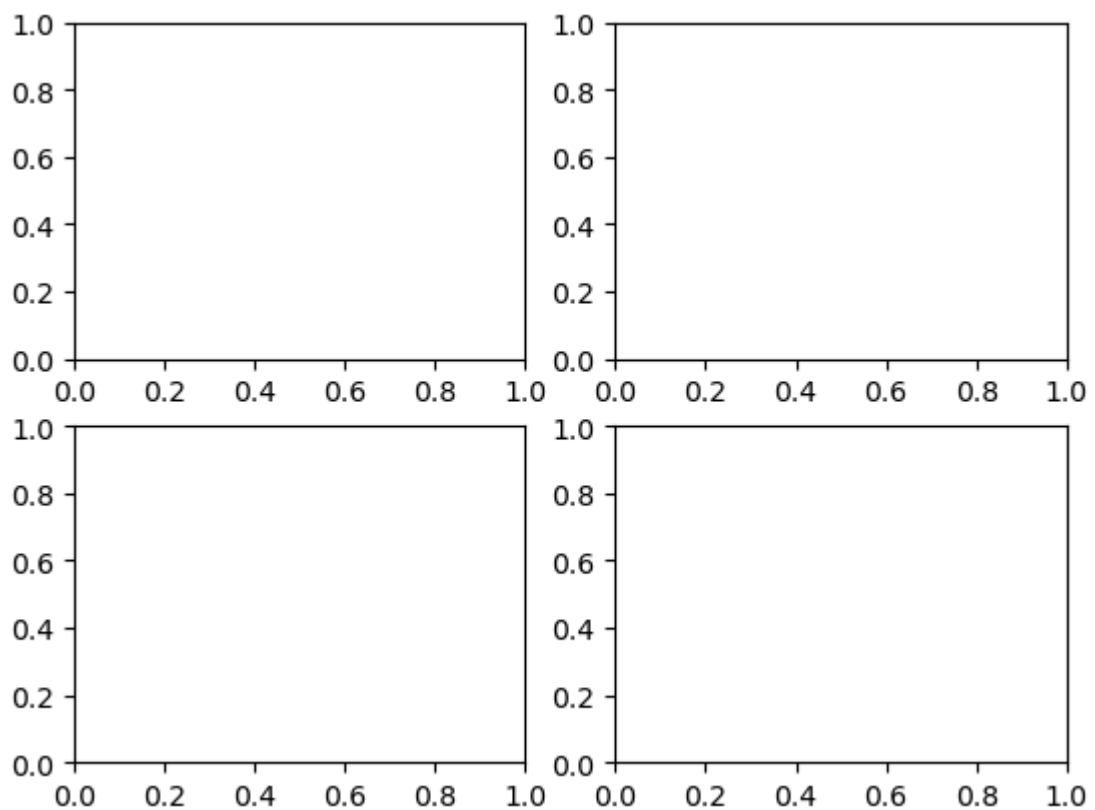


```
In [100... fig=plt.figure()
ax=plt.axes()
plt.show()
```



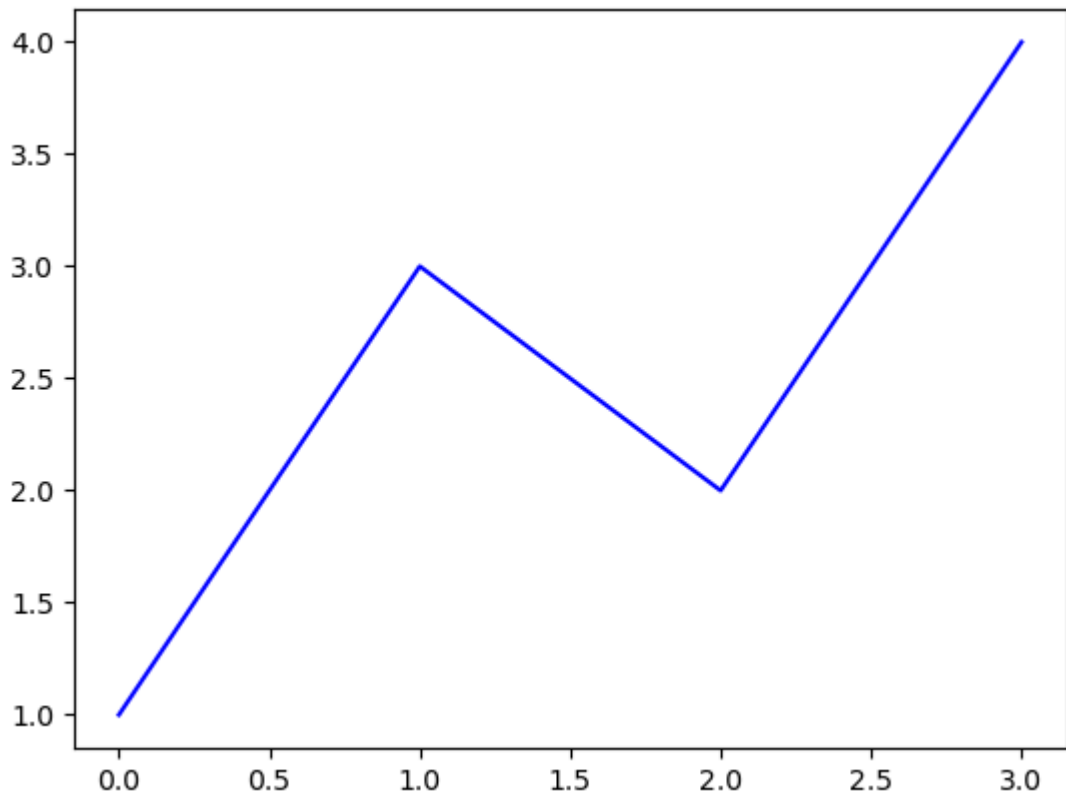


```
In [102... fig=plt.figure()  
ax1=fig.add_subplot(2,2,1)  
ax2=fig.add_subplot(2,2,2)  
ax3=fig.add_subplot(2,2,3)  
ax4=fig.add_subplot(2,2,4)  
plt.show()
```

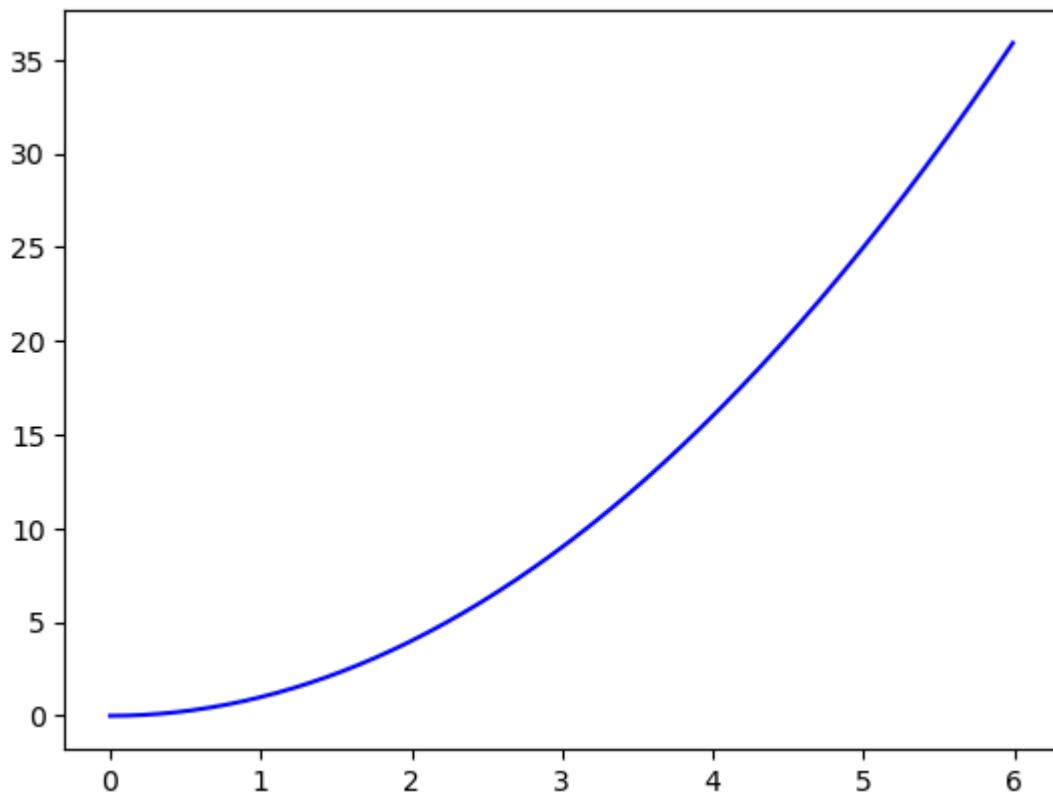


```
In [104... plt.plot([1,3,2,4], 'b-')
```

```
plt.show()
```

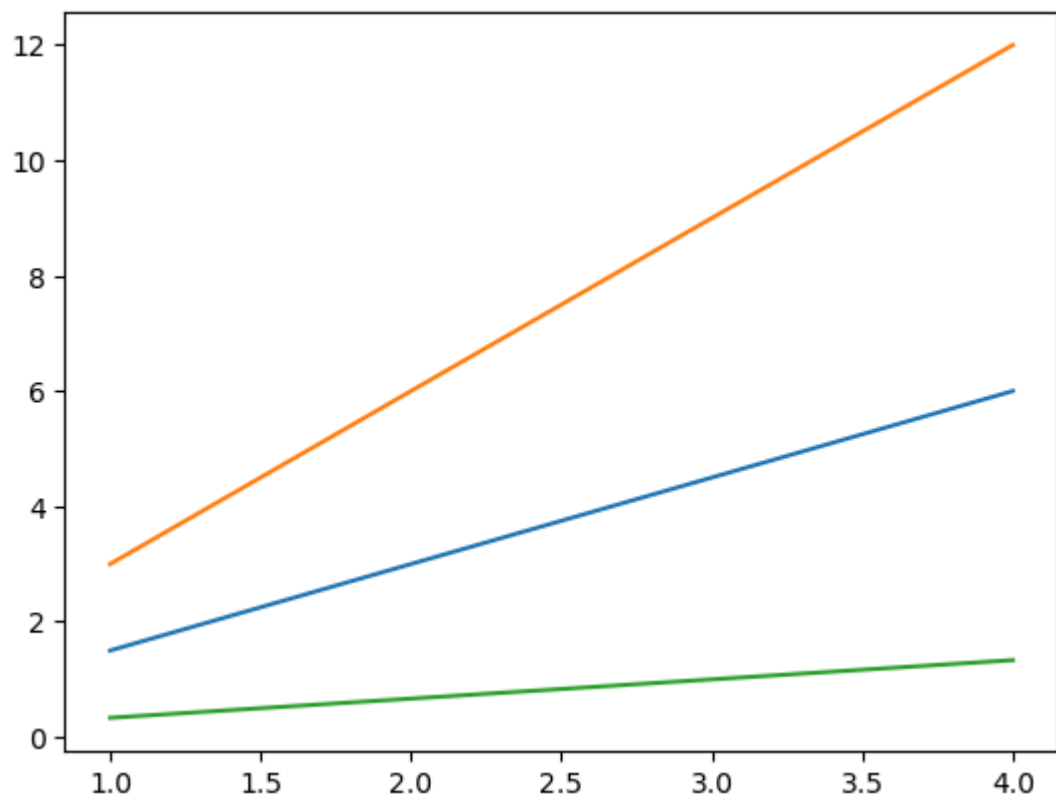


```
In [106... x3=np.arange(0.0,6.0,0.01)
plt.plot(x3,[xi**2 for xi in x3],'b-')
plt.show()
```



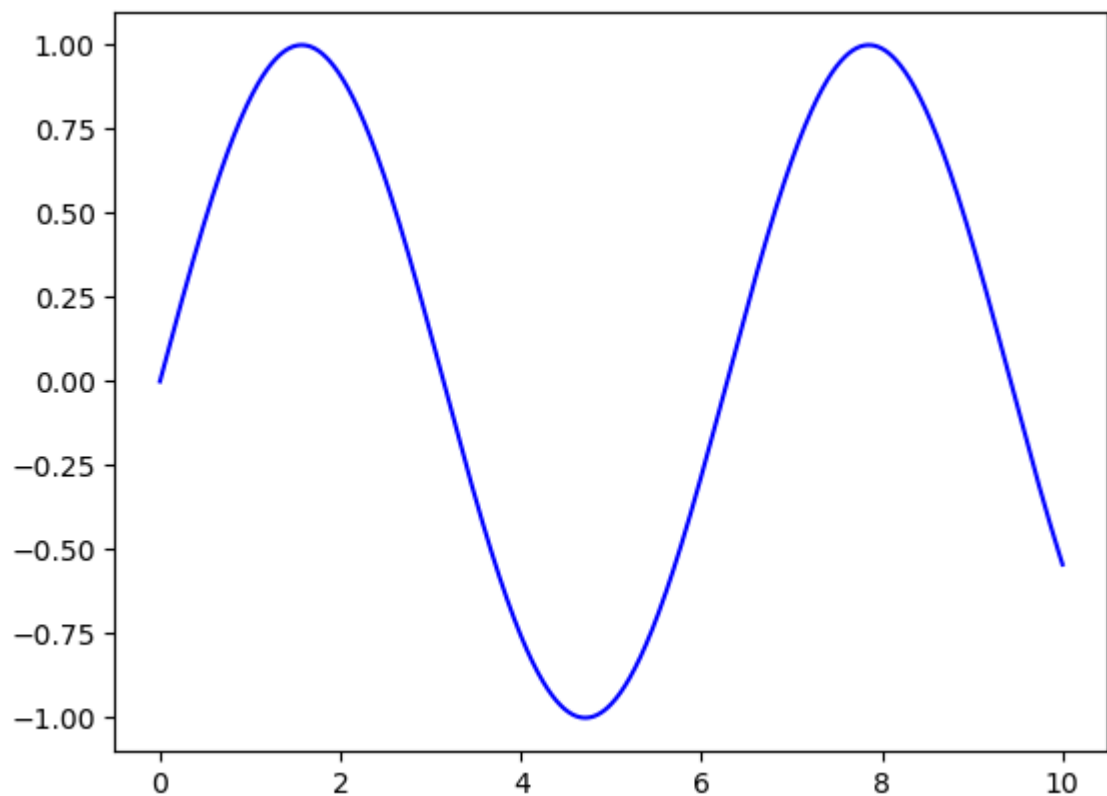
```
In [107... x4=range(1,5)
plt.plot(x4,[xi*1.5 for xi in x4])
plt.plot(x4,[xi*3 for xi in x4])
```

```
plt.plot(x4,[xi/3.0 for xi in x4])  
plt.show()
```



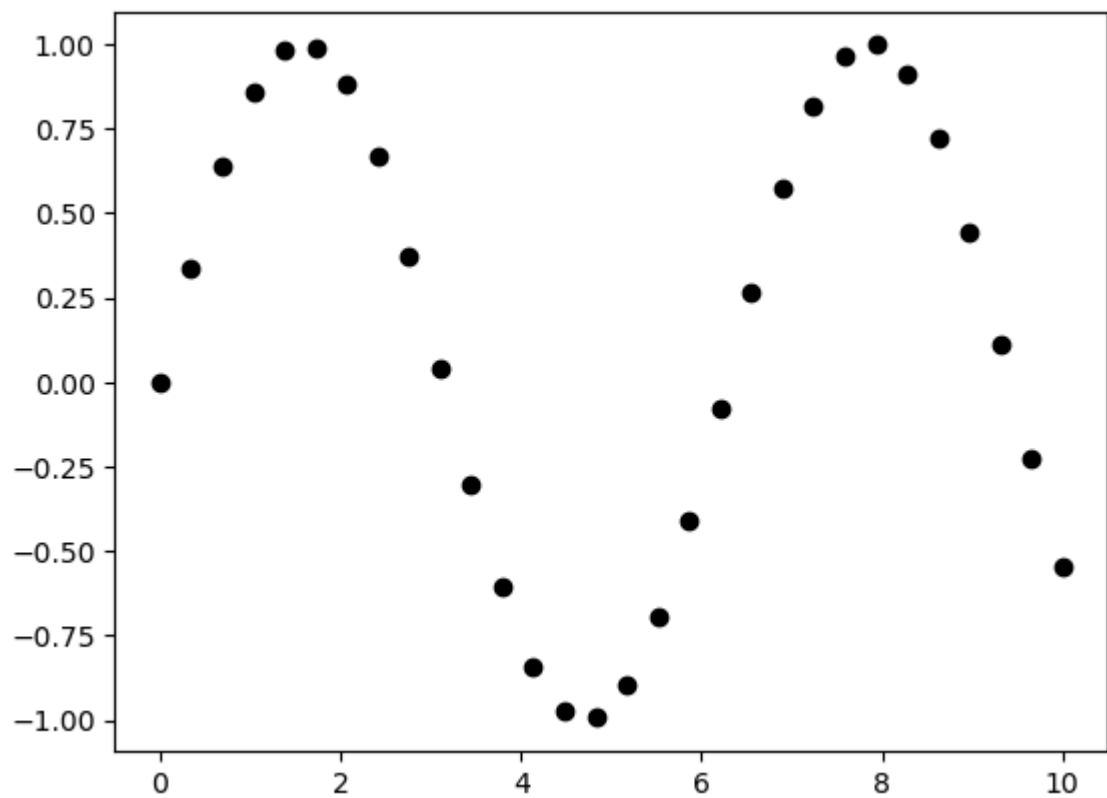
In [116...

```
fig=plt.figure()  
ax=plt.axes()  
x5=np.linspace(0,10,1000)  
ax.plot(x5,np.sin(x5),'b-');  
plt.show()
```



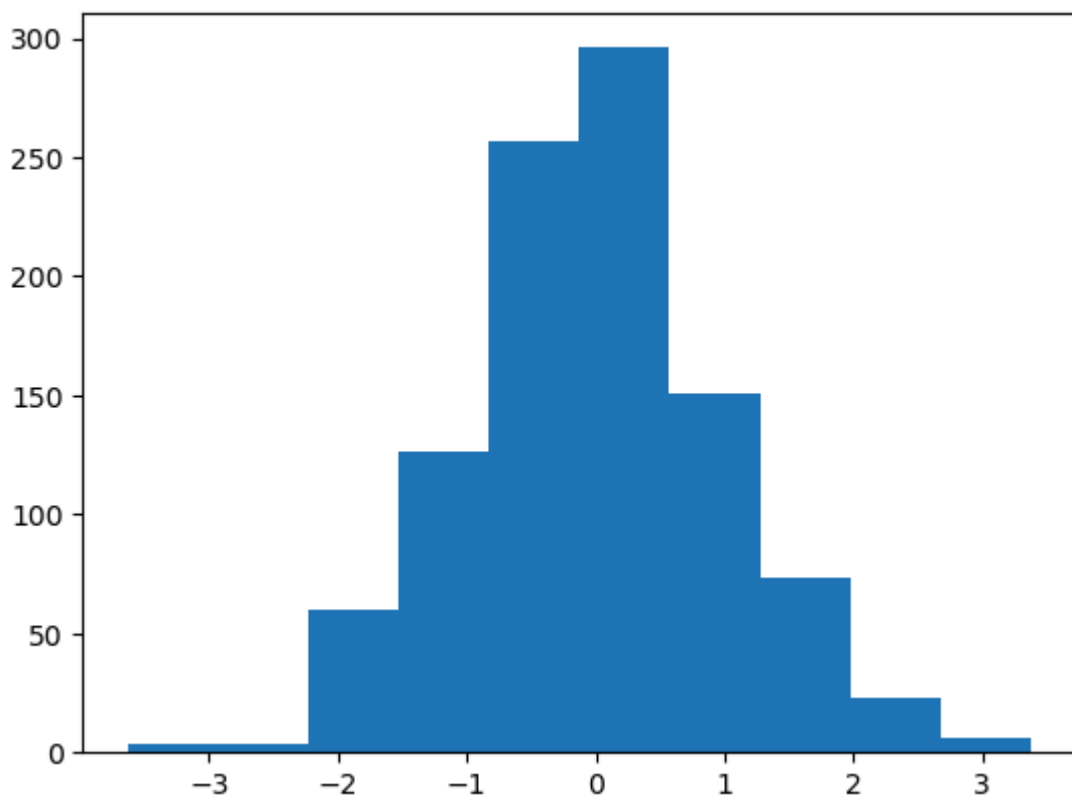
In [118...

```
x7=np.linspace(0,10,30)
y7=np.sin(x7)
plt.plot(x7,y7,'o',color='black');
plt.show()
```



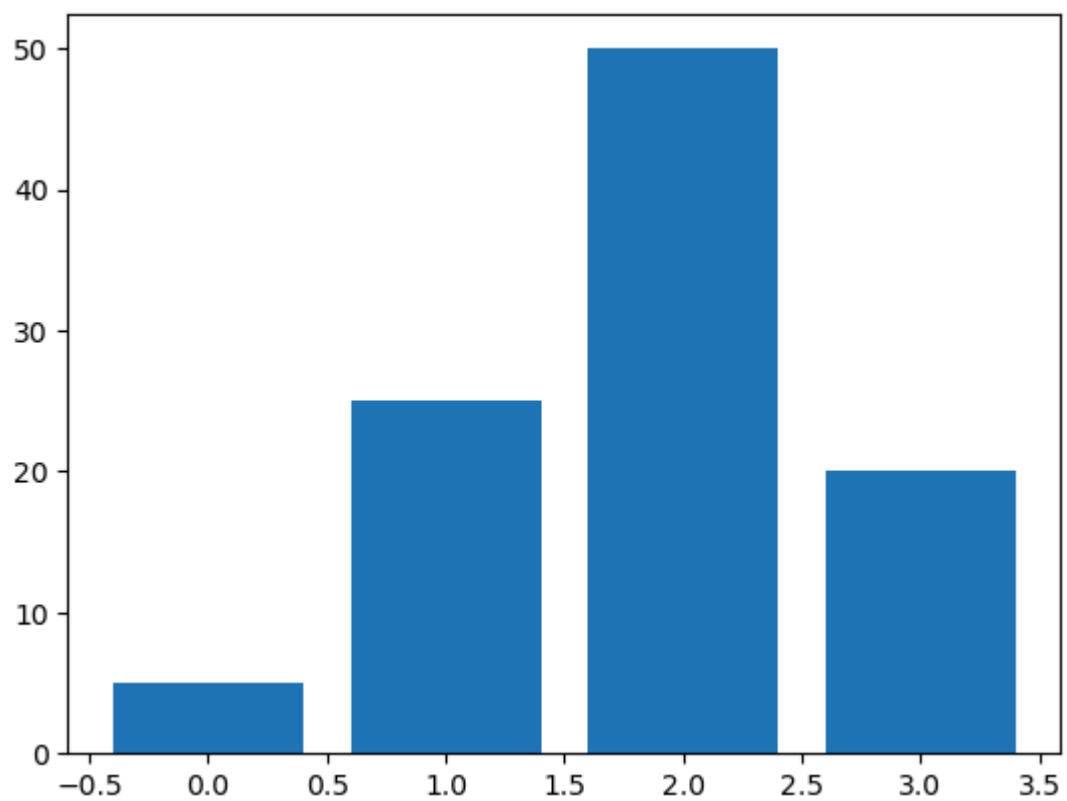
In [120...

```
data1=np.random.randn(1000)
plt.hist(data1);
plt.show()
```



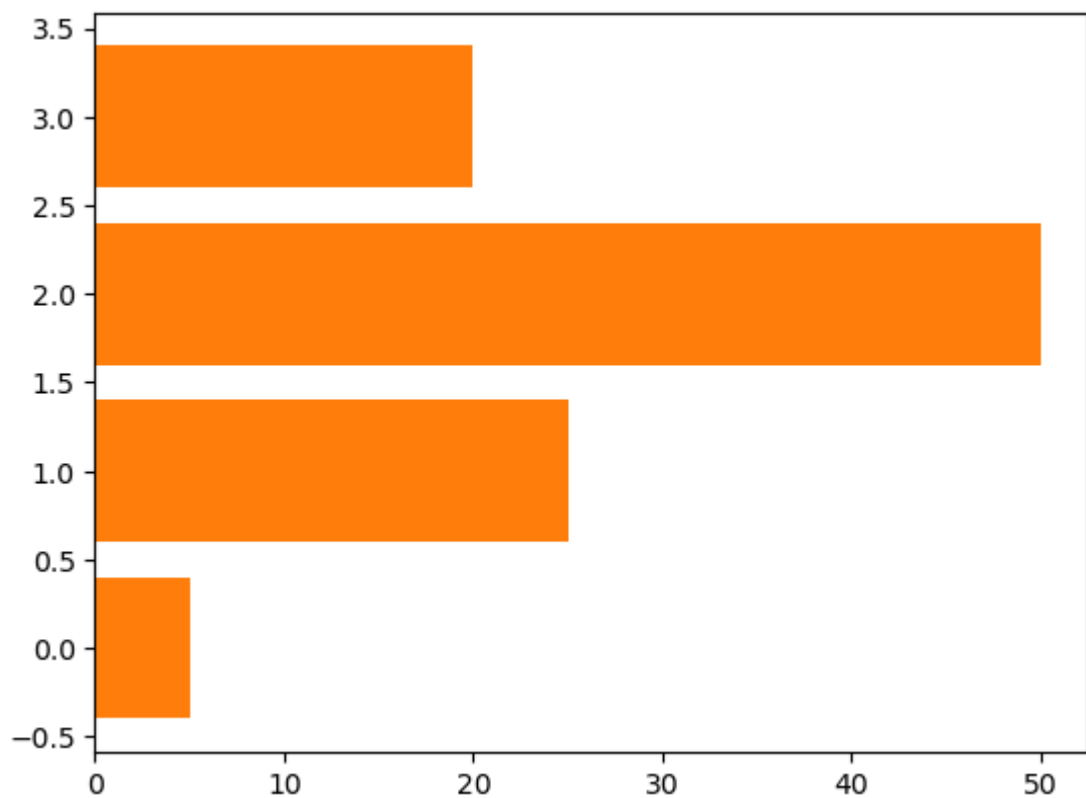
In [122...

```
data2=[5.,25.,50.,20.]  
plt.bar(range(len(data2)),data2)  
plt.show()
```



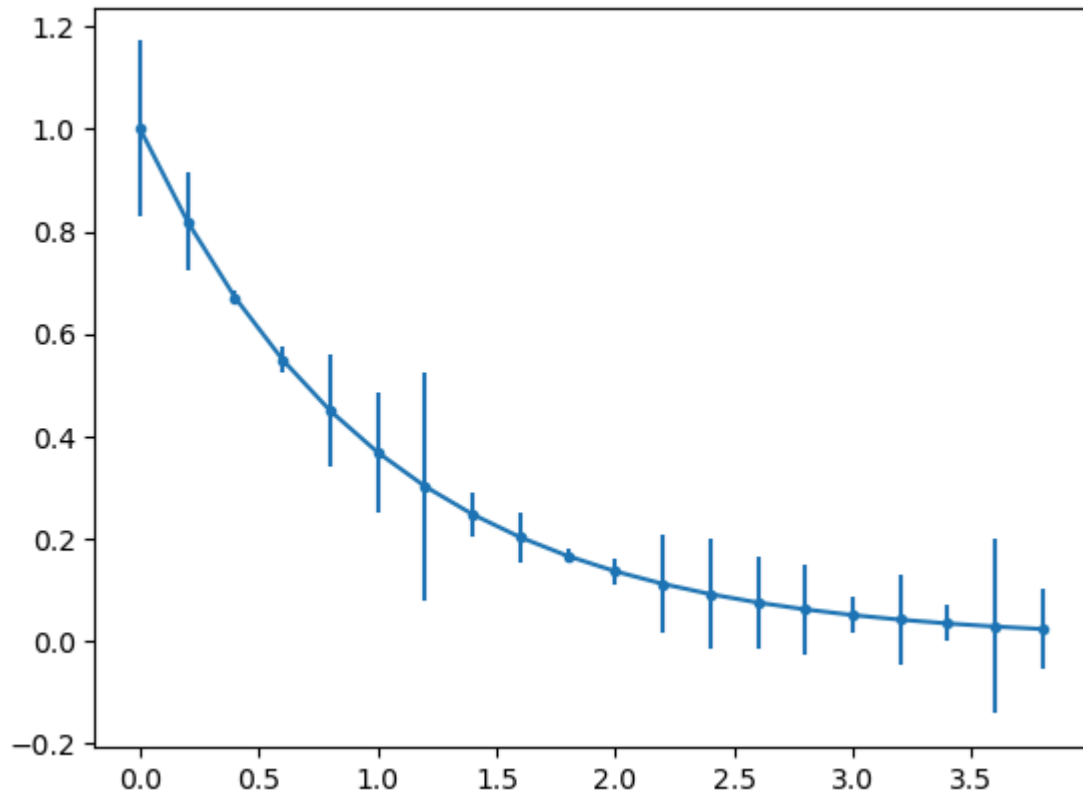
In [126...

```
data2=[5.,25.,50.,20.]  
plt.barh(range(len(data2)),data2)  
plt.show()
```



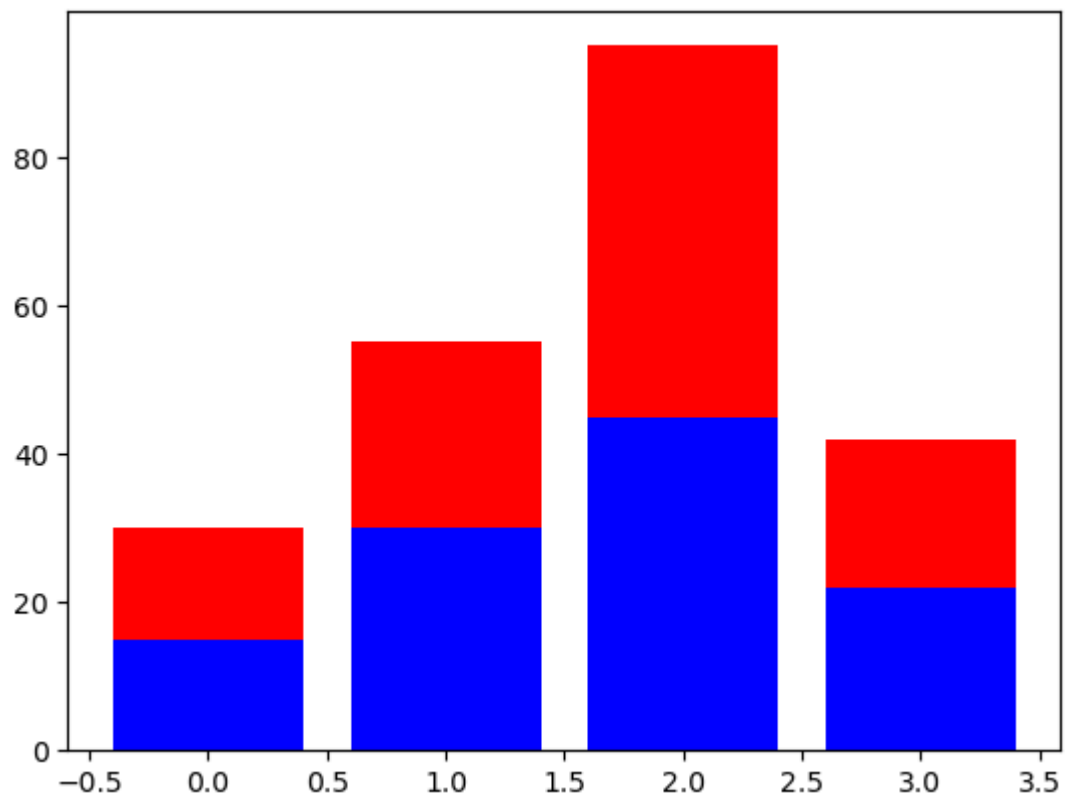
In [132...

```
x9=np.arange(0,4,0.2)
y9=np.exp(-x9)
e1=0.1*np.abs(np.random.randn(len(y9)))
plt.errorbar(x9,y9,yerr=e1,fmt='.-')
plt.show()
```

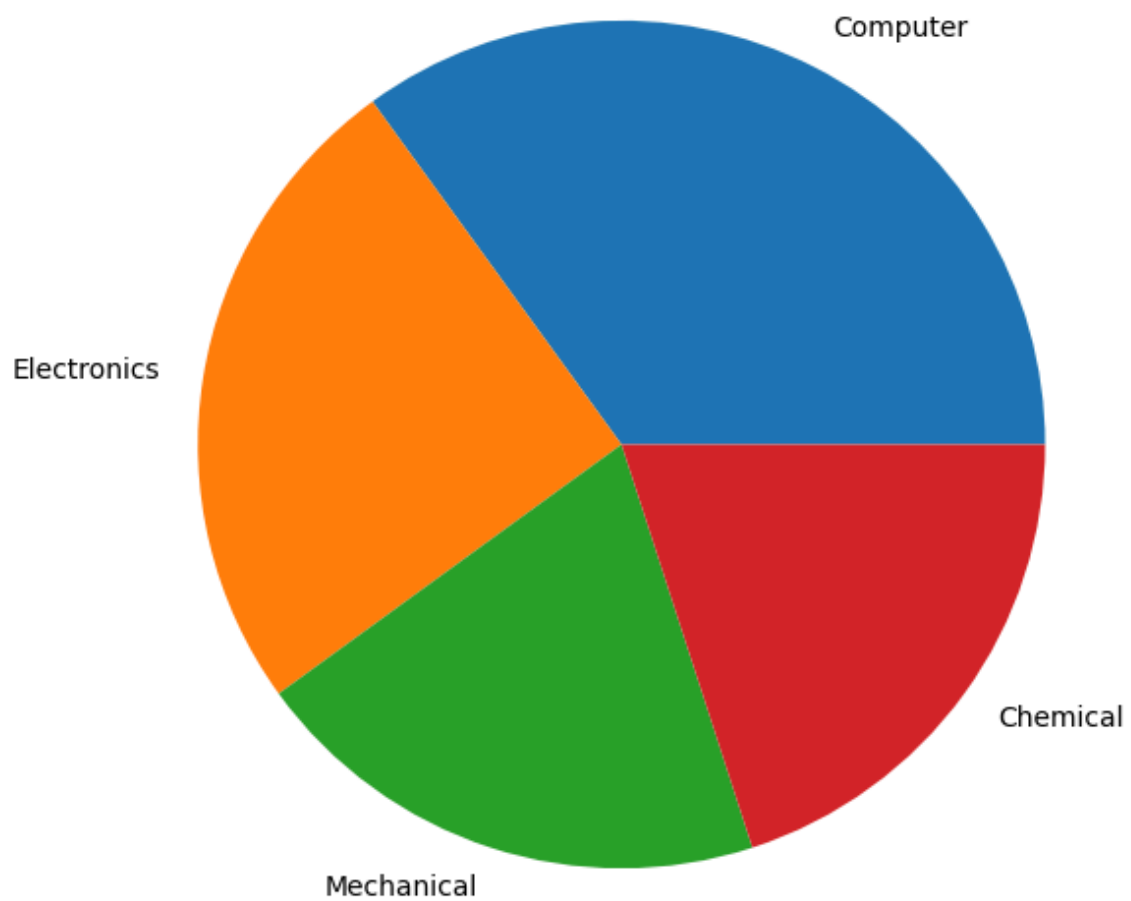


In [134...

```
A=[15.,30.,45.,22.]
B=[15.,25.,50.,20.]
z2=range(4)
plt.bar(z2,A,color='b')
plt.bar(z2,B,color='r',bottom=A)
plt.show()
```

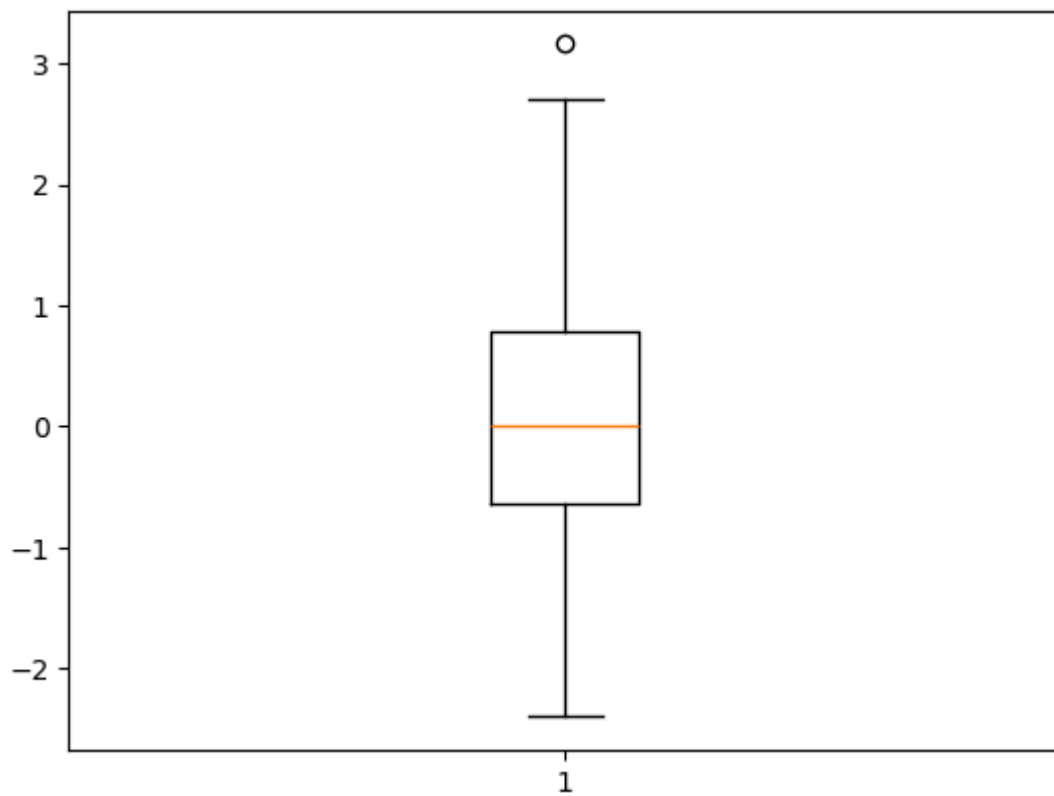


```
In [136... plt.figure(figsize=(7,7))
x10=[35,25,20,20]
labels=['Computer','Electronics','Mechanical','Chemical']
plt.pie(x10,labels=labels);
plt.show()
```



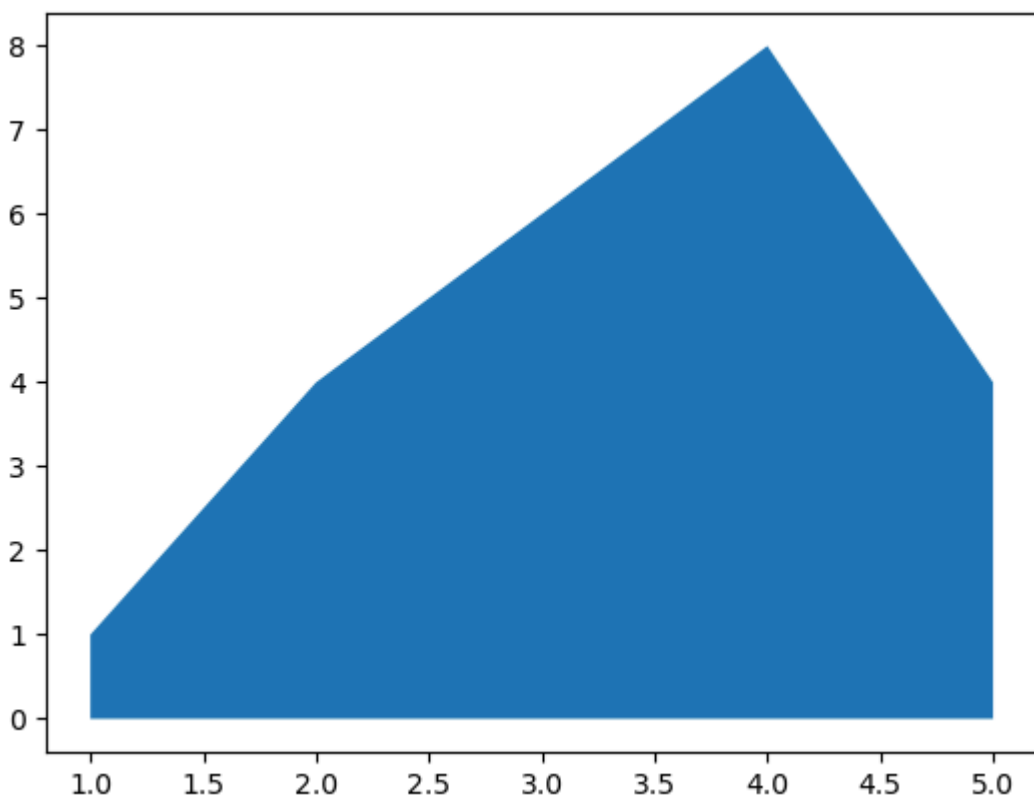
```
In [138... data3=np.random.randn(100)
plt.boxplot(data3)
plt.show();
```





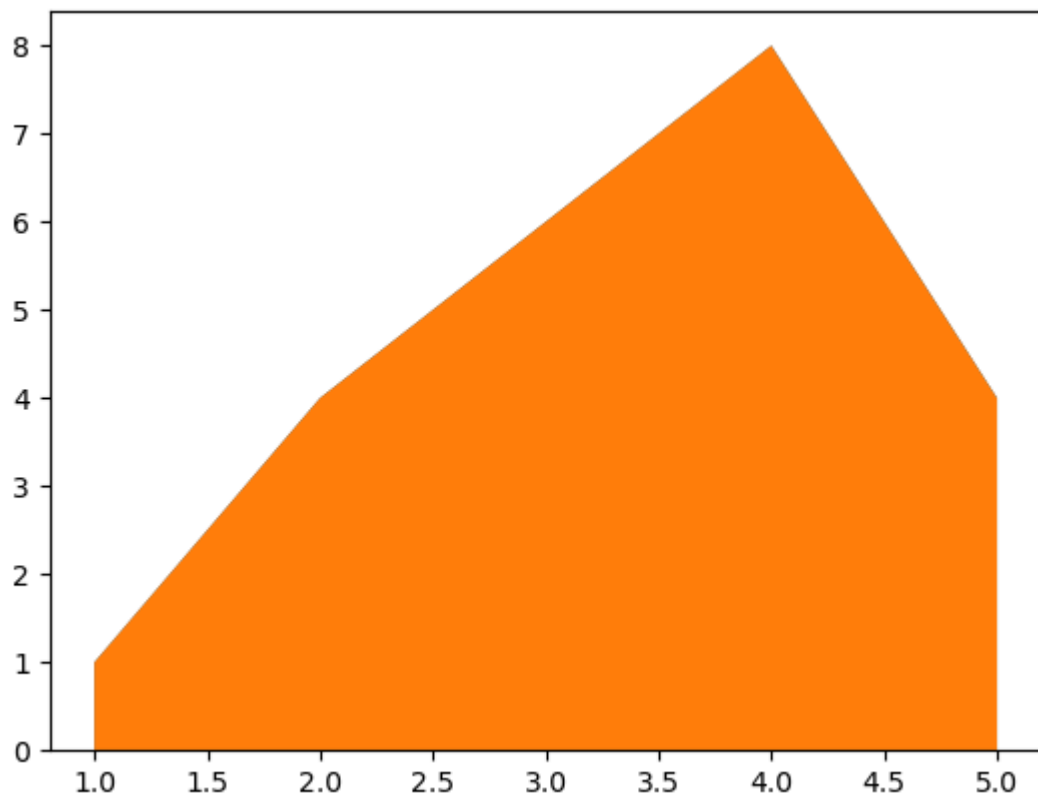
In [140...

```
x12=range(1,6)
y12=[1,4,6,8,4]
plt.fill_between(x12,y12)
plt.show()
```

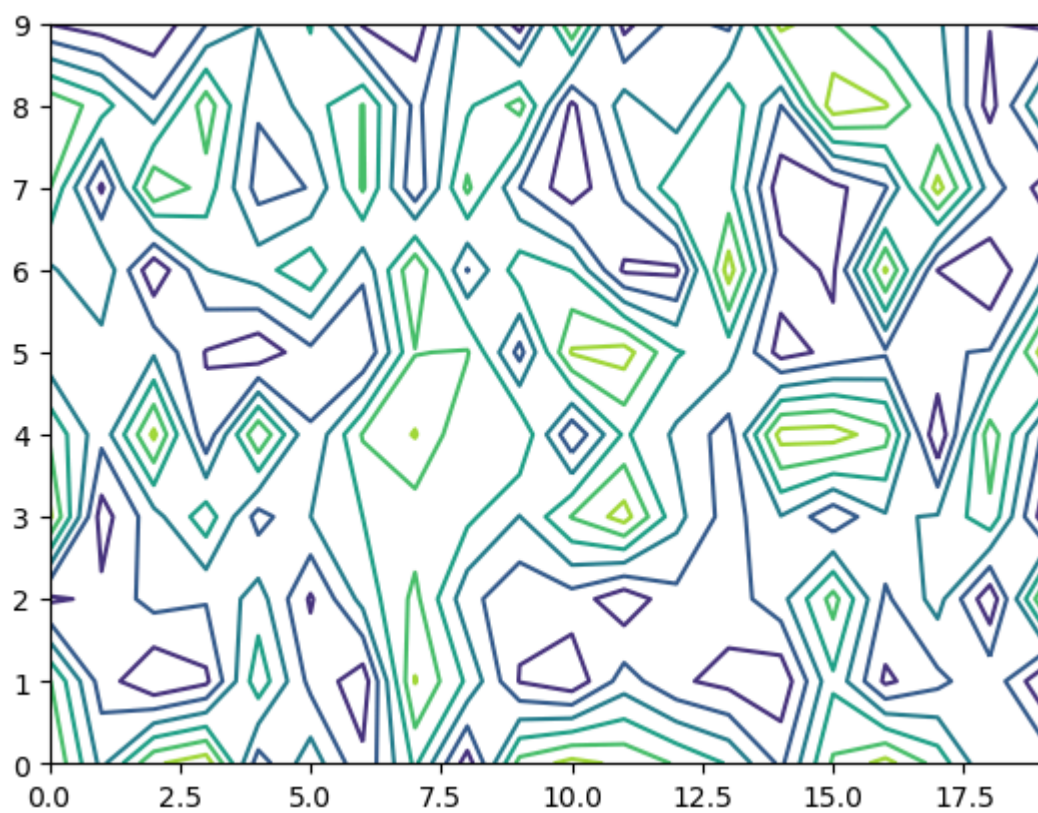


In [144...

```
plt.stackplot(x12,y12)
plt.show()
```



```
In [146... matrix1=np.random.rand(10,20)
cp=plt.contour(matrix1)
plt.show()
```

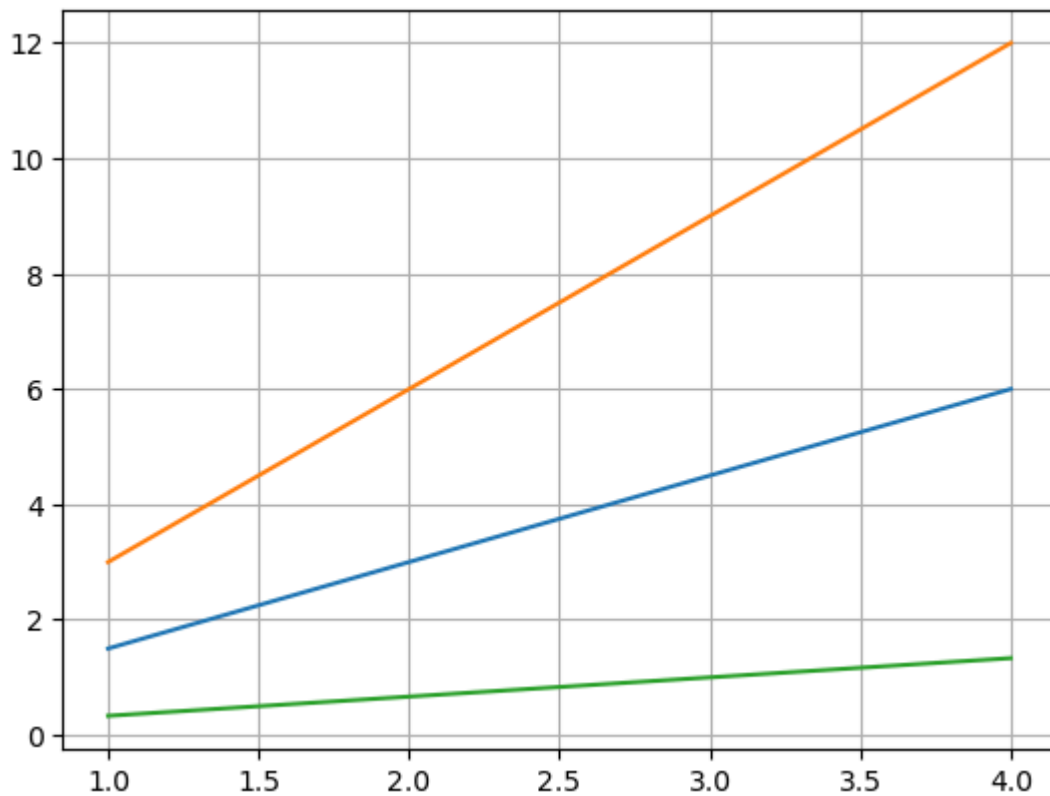


```
In [155... print(plt.style.available)
```

```
['Solarize_Light2', '_classic_test_patch', '_mpl-gallery', '_mpl-gallery-nogrid',  
'bmh', 'classic', 'dark_background', 'fast', 'fivethirtyeight', 'ggplot', 'grayscale', 'seaborn-v0_8', 'seaborn-v0_8-bright', 'seaborn-v0_8-colorblind', 'seaborn-v0_8-dark', 'seaborn-v0_8-dark-palette', 'seaborn-v0_8-darkgrid', 'seaborn-v0_8-deep', 'seaborn-v0_8-muted', 'seaborn-v0_8-notebook', 'seaborn-v0_8-paper', 'seaborn-v0_8-pastel', 'seaborn-v0_8-poster', 'seaborn-v0_8-talk', 'seaborn-v0_8-ticks', 'seaborn-v0_8-white', 'seaborn-v0_8-whitegrid', 'tableau-colorblind10']
```

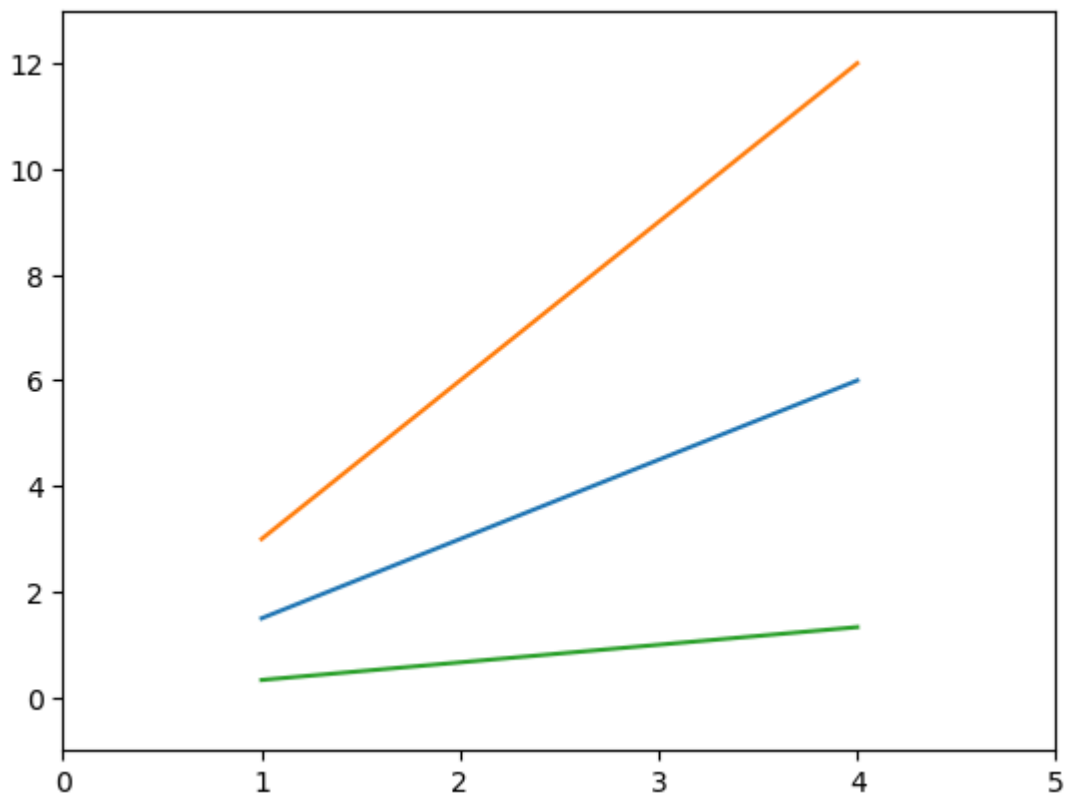
In [160...

```
x15=np.arange(1,5)  
plt.plot(x15,x15*1.5,x15,x15*3.0,x15,x15/3.0)  
plt.grid(True)  
plt.show()
```



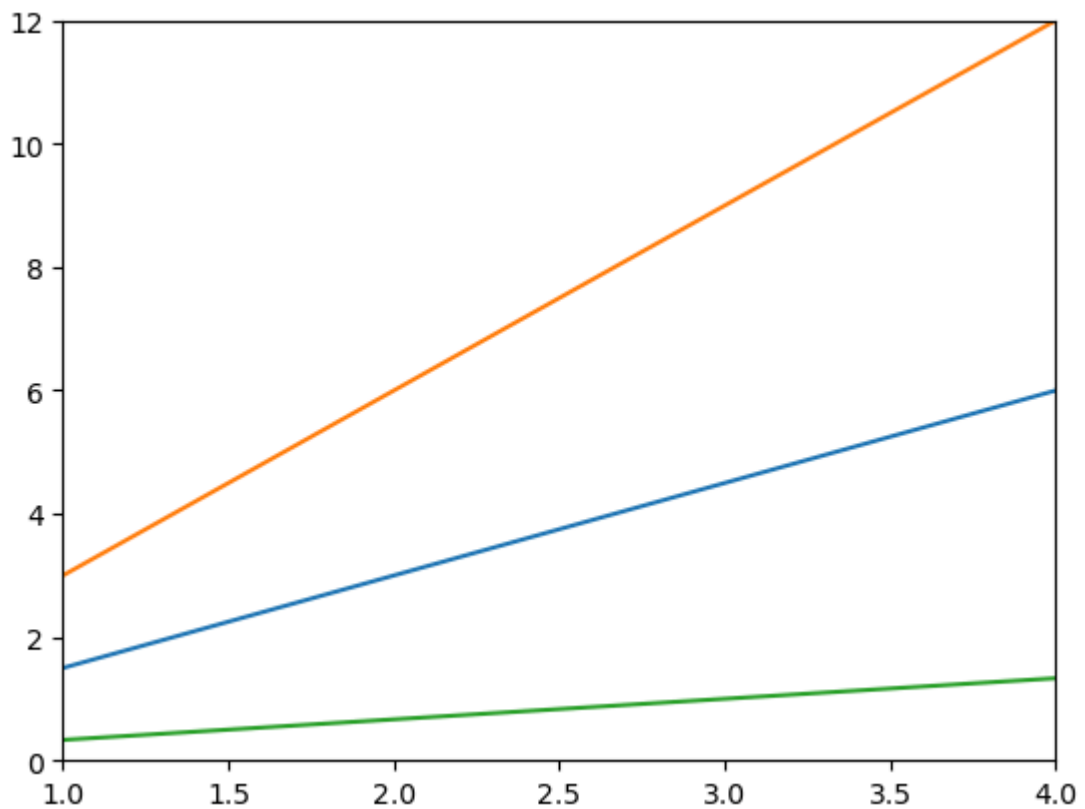
In [162...

```
x15=np.arange(1,5)  
plt.plot(x15,x15*1.5,x15,x15*3.0,x15,x15/3.0)  
plt.axis()  
plt.axis([0,5,-1,13])  
plt.show()
```



In [164...

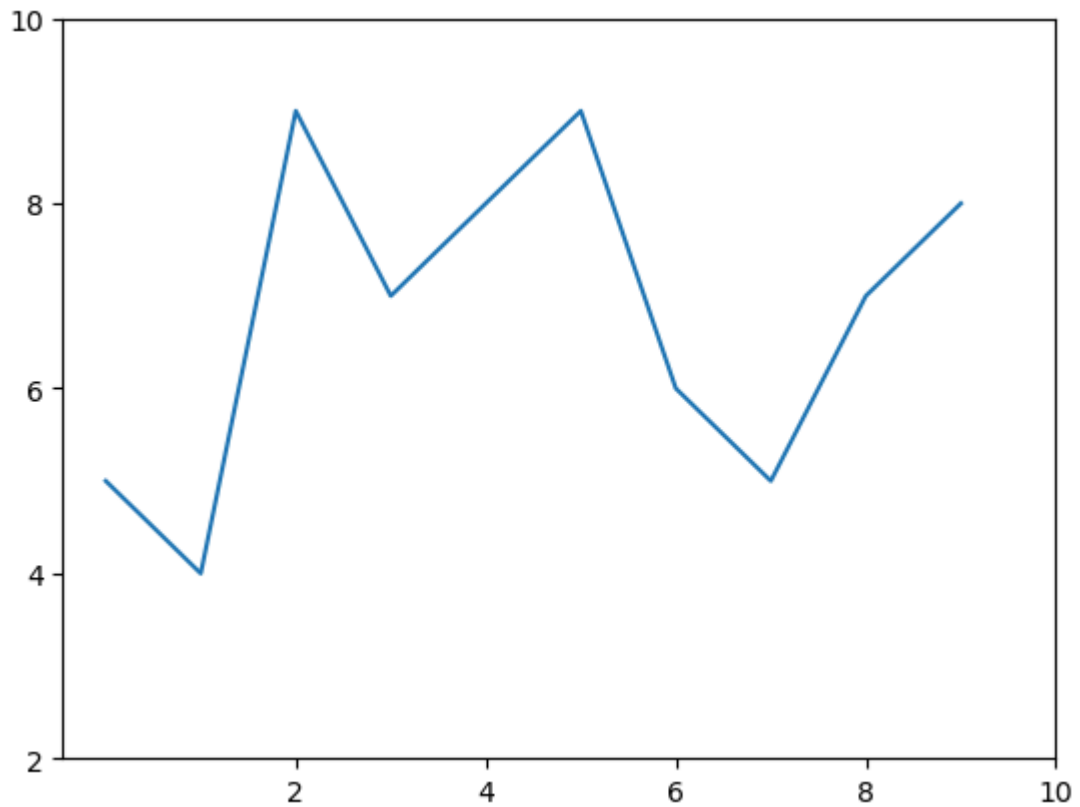
```
x15=np.arange(1,5)
plt.plot(x15,x15*1.5,x15,x15*3.0,x15,x15/3.0)
plt.xlim([1.0,4.0])
plt.ylim([0.0,12.0])
plt.show()
```



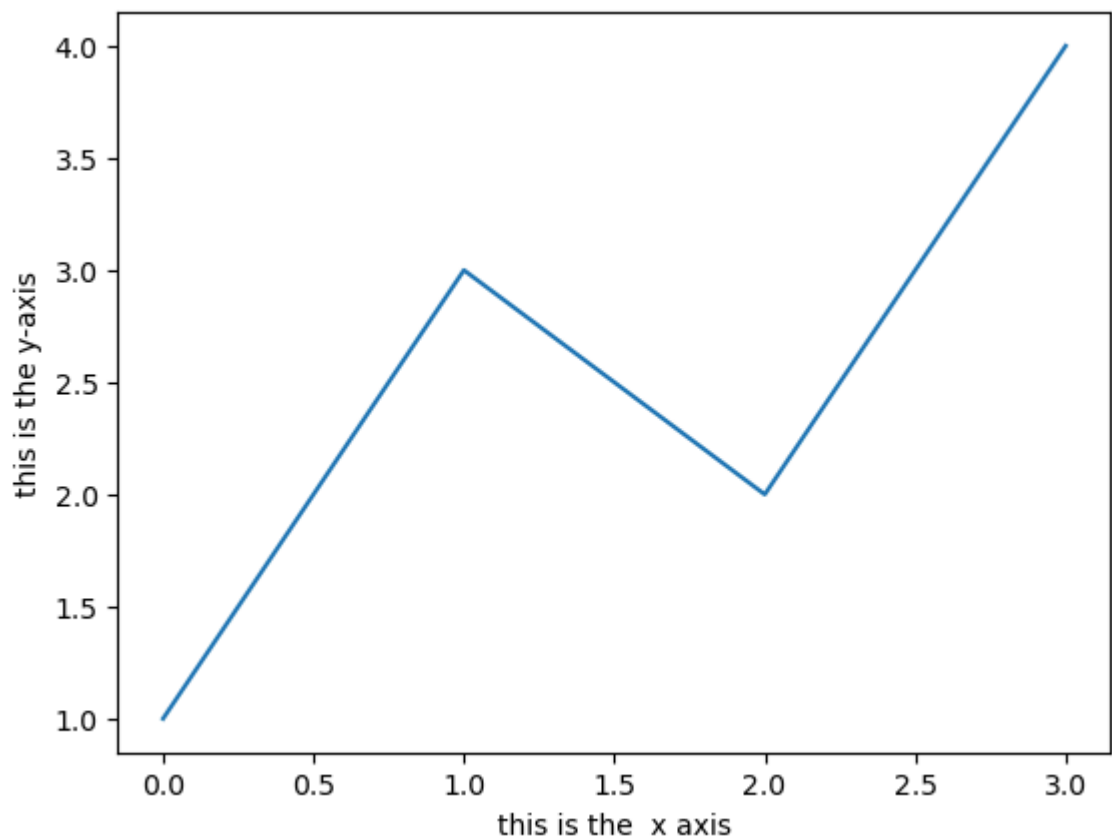
In [166...

```
u=[5,4,9,7,8,9,6,5,7,8]
plt.plot(u)
plt.xticks([2,4,6,8,10])
```

```
plt.yticks([2,4,6,8,10])  
plt.show()
```

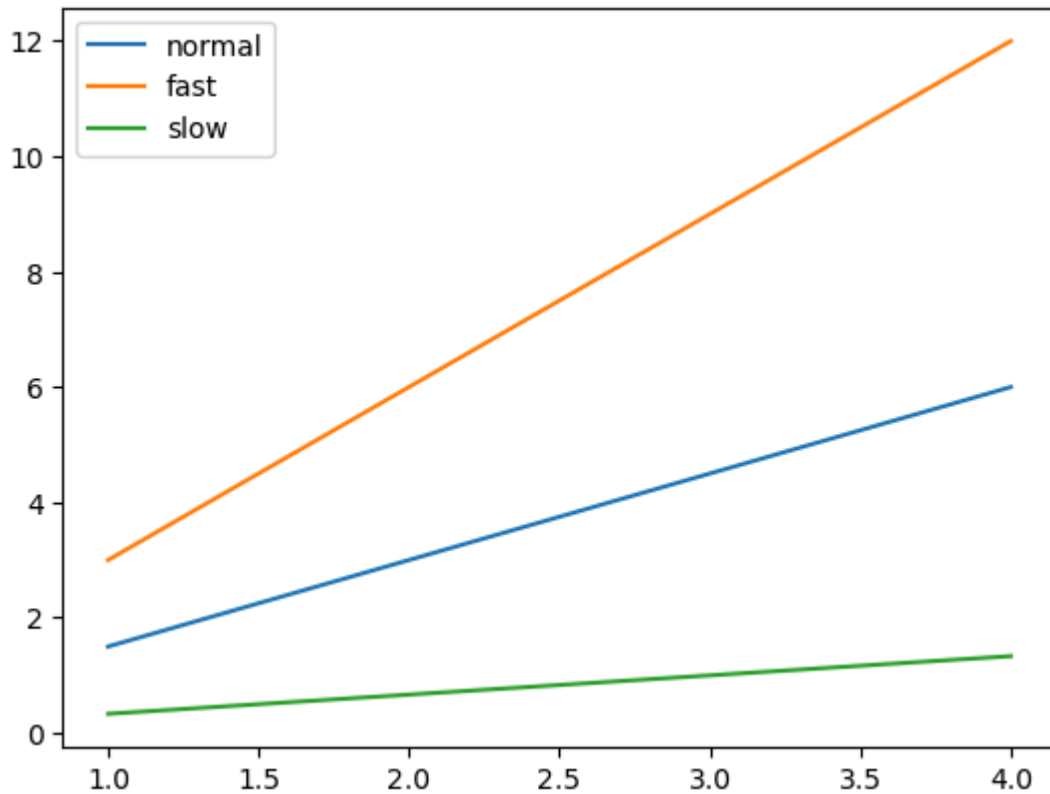


```
In [168... plt.plot([1,3,2,4])  
plt.xlabel('this is the x axis')  
plt.ylabel('this is the y-axis')  
plt.show()
```



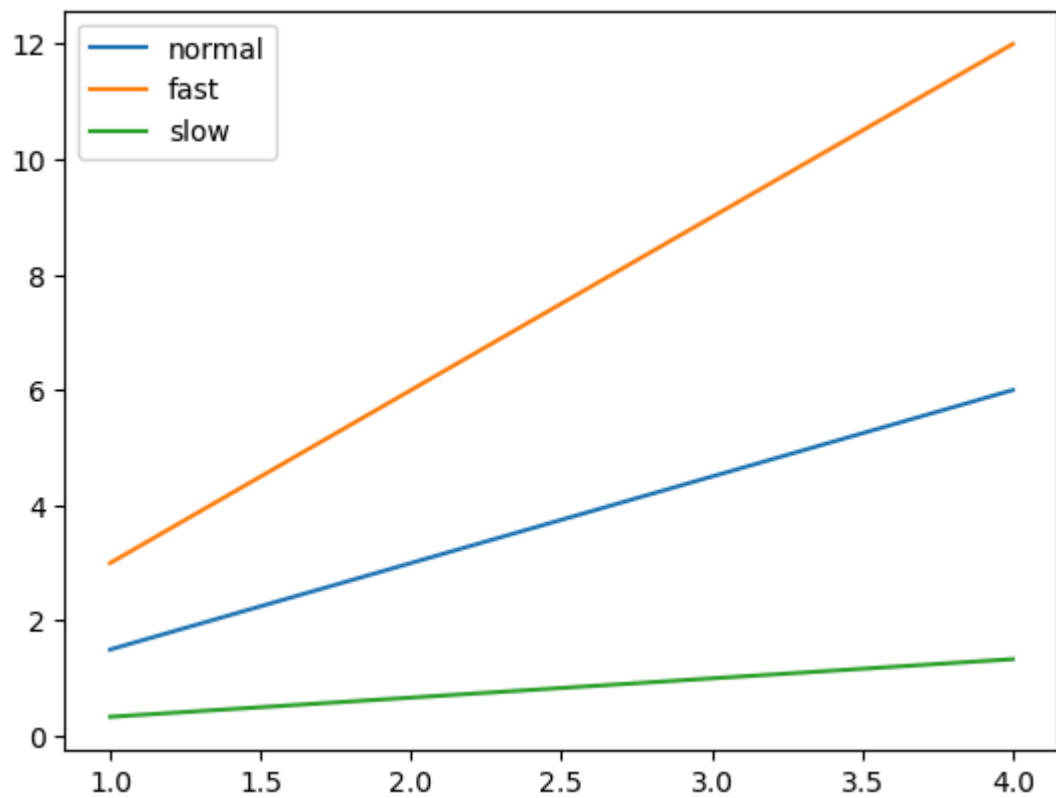
In [170...

```
x15=np.arange(1,5)
fig,ax=plt.subplots()
ax.plot(x15,x15*1.5)
ax.plot(x15,x15*3.0)
ax.plot(x15,x15/3.0)
ax.legend(['normal','fast','slow'])
plt.show()
```



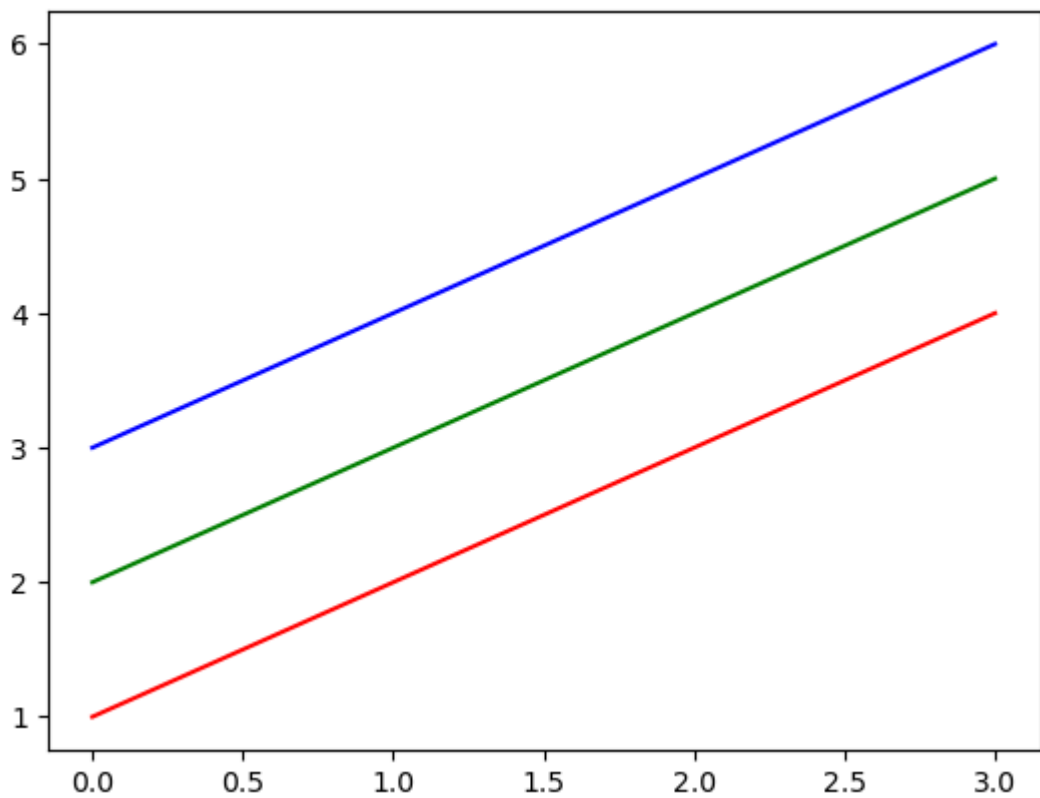
In [172...

```
x15=np.arange(1,5)
fig,ax=plt.subplots()
ax.plot(x15,x15*1.5,label='normal')
ax.plot(x15,x15*3.0,label='fast')
ax.plot(x15,x15/3.0,label='slow')
ax.legend();
plt.show()
```



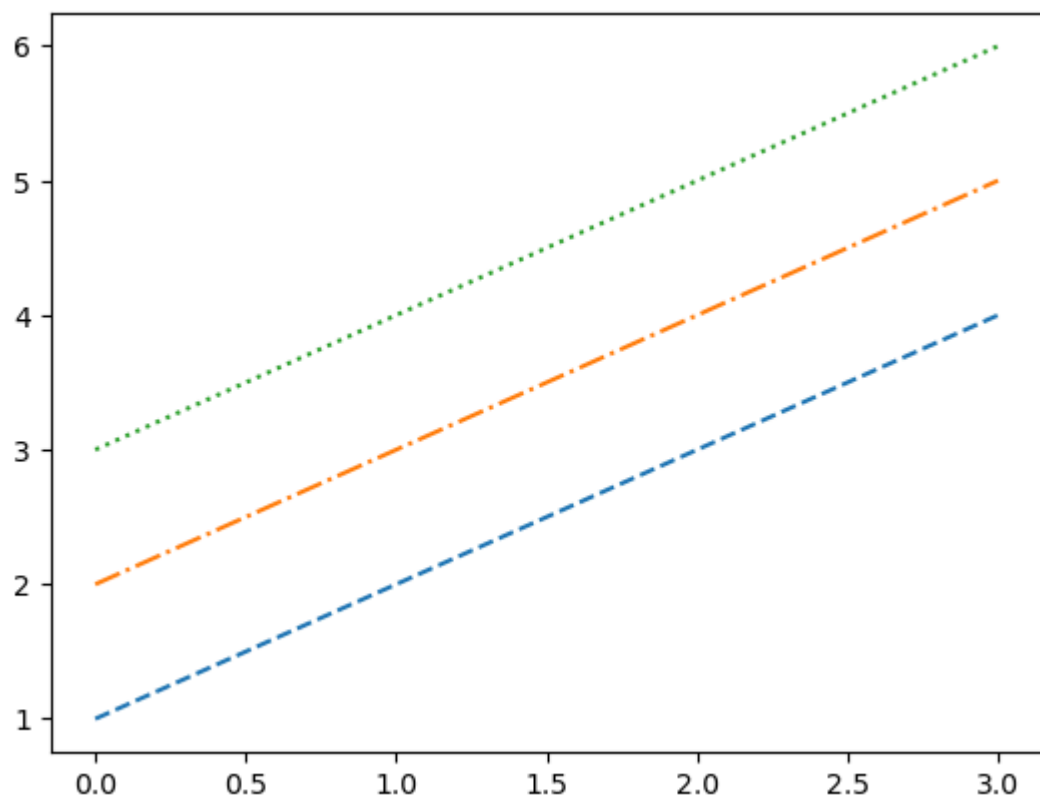
In [176...

```
x16=np.arange(1,5)
plt.plot(x16,'r')
plt.plot(x16+1,'g')
plt.plot(x16+2,'b')
plt.show()
```



In [180...

```
x16=np.arange(1,5)
plt.plot(x16,'--',x16+1,'-.',x16+2,':')
plt.show()
```



In [ ]:

In [ ]: