

Matplotlib Library

https://matplotlib.org/api/_as_gen/matplotlib.pyplot.plot.html
(https://matplotlib.org/api/_as_gen/matplotlib.pyplot.plot.html)

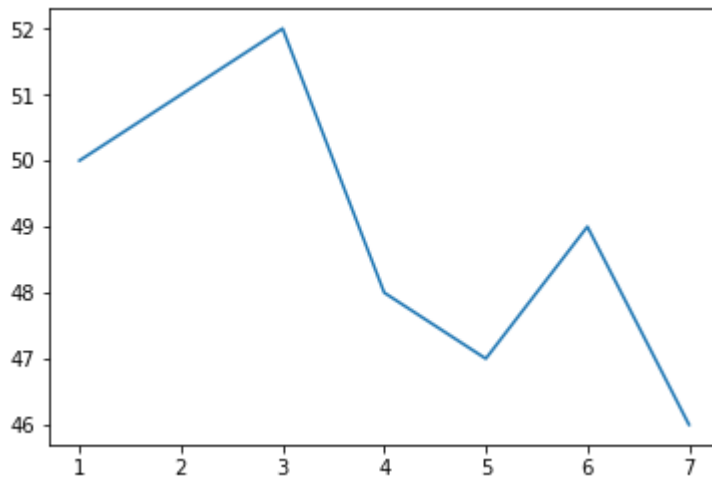
Import Matplotlib Library

```
In [1]: import matplotlib.pyplot as plt  
%matplotlib inline
```

Line Graph

```
In [2]: x=[1,2,3,4,5,6,7]  
y=[50,51,52,48,47,49,46]  
plt.plot(x,y)
```

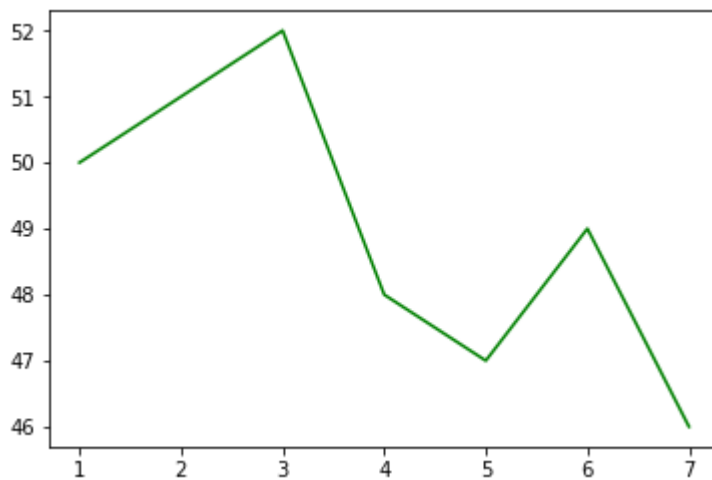
```
Out[2]: [<matplotlib.lines.Line2D at 0x8982a20>]
```



Line Color

```
In [3]: x=[1,2,3,4,5,6,7]  
y=[50,51,52,48,47,49,46]  
plt.plot(x,y,color='green')
```

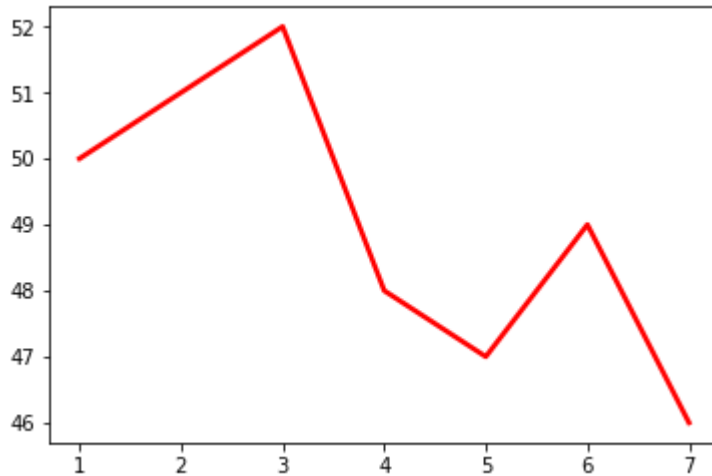
```
Out[3]: [<matplotlib.lines.Line2D at 0x8a21a20>]
```



Linewidth

```
In [4]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.plot(x,y,color='red',linewidth=2.5)
```

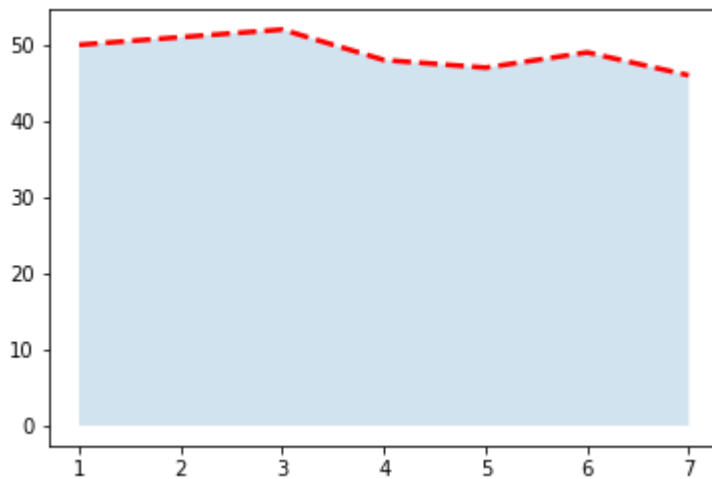
```
Out[4]: [<matplotlib.lines.Line2D at 0x8ccf6d8>]
```



fill_between

```
In [5]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.plot(x,y,linewidth=2.5,color='r',linestyle='dashed')
plt.fill_between(x, y,alpha=0.2)
```

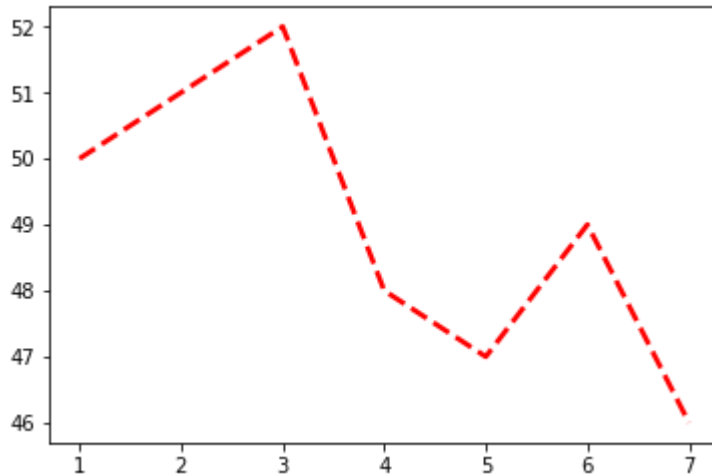
```
Out[5]: <matplotlib.collections.PolyCollection at 0x8ca14e0>
```



Linestyle

```
In [6]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed')
```

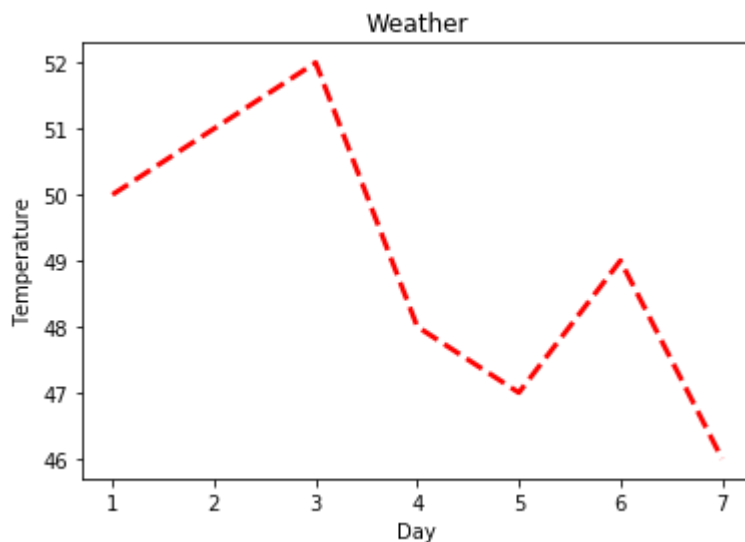
```
Out[6]: [matplotlib.lines.Line2D at 0x8db9080>]
```



x-axis and Title Label

```
In [7]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed')
```

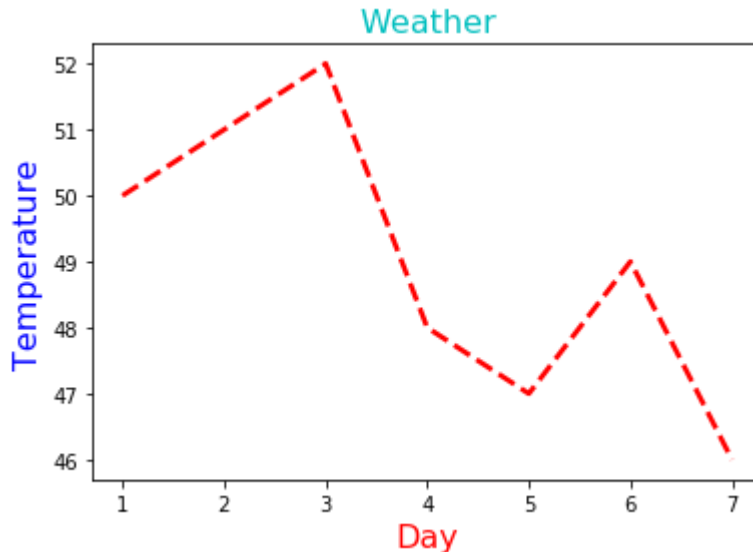
```
Out[7]: [matplotlib.lines.Line2D at 0x8d8f898>]
```



x-axis and Title Label(Properties)

```
In [8]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.xlabel('Day',color='r',fontsize=16)
plt.ylabel('Temperature',color='b',fontsize=16)
plt.title('Weather',color='c',fontsize=16)
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed')
```

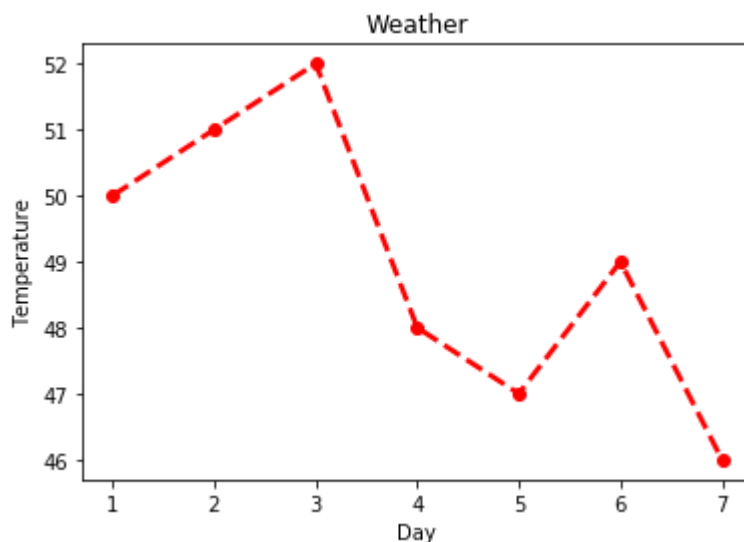
Out[8]: [



Maker

```
In [9]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed',marker="o")
```

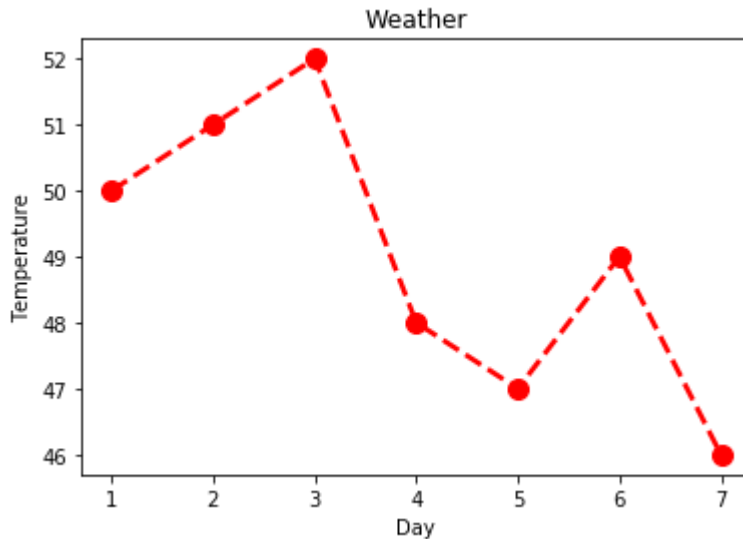
Out[9]: [



markersize

```
In [10]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed',marker="o",markersize=10)
```

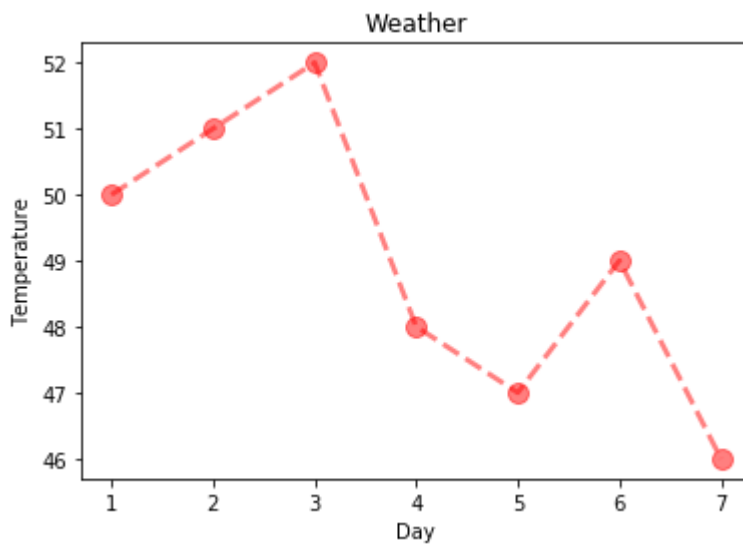
Out[10]: [



Alpha

```
In [11]: x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.plot(x,y,color='red',linewidth=2.5,linestyle='dashed',marker="o",markersize=10)
#range of alpha is 0 to 1.
```

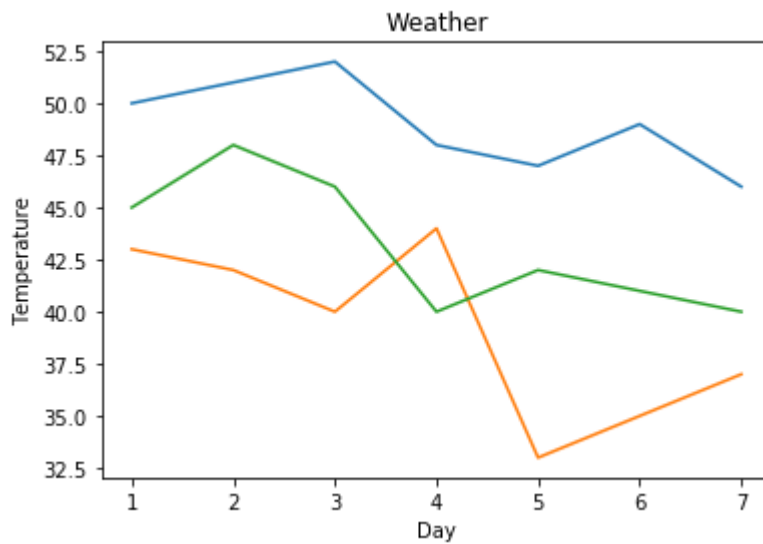
Out[11]: [



MultiLine Graph

```
In [12]: days=[1,2,3,4,5,6,7]
max_t=[50,51,52,48,47,49,46]
min_t=[43,42,40,44,33,35,37]
avg_t=[45,48,46,40,42,41,40]
plt.plot(days,max_t)
plt.plot(days,min_t)
plt.plot(days,avg_t)
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
```

Out[12]: Text(0.5,1,'Weather')

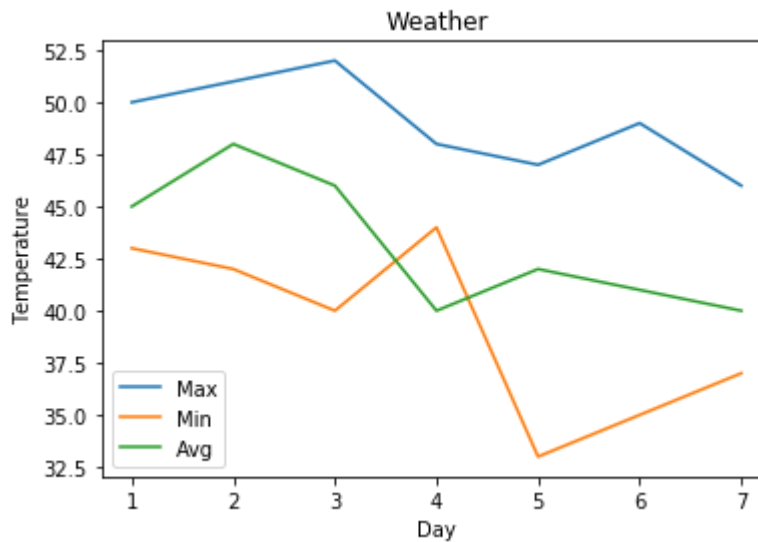


Legend

Example-1

```
In [13]: days=[1,2,3,4,5,6,7]
max_t=[50,51,52,48,47,49,46]
min_t=[43,42,40,44,33,35,37]
avg_t=[45,48,46,40,42,41,40]
plt.plot(days,max_t,label="Max")
plt.plot(days,min_t,label="Min")
plt.plot(days,avg_t,label="Avg")
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.legend()
```

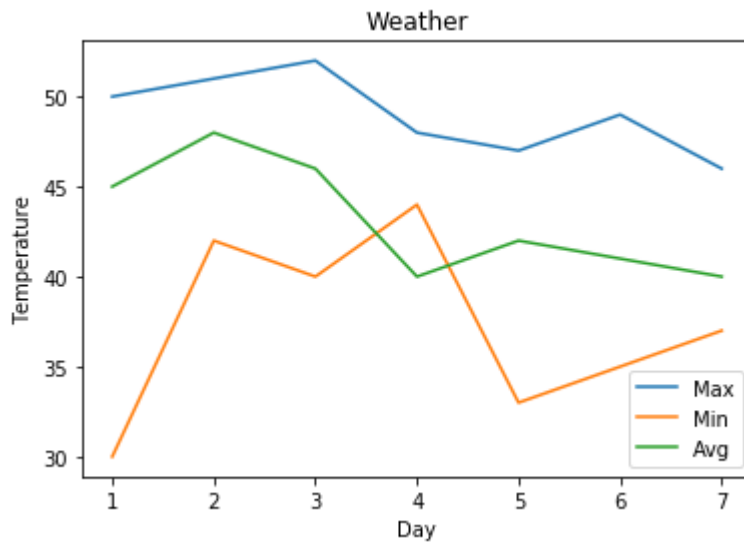
Out[13]: <matplotlib.legend.Legend at 0xa051e48>



Example-2


```
In [14]: days=[1,2,3,4,5,6,7]
max_t=[50,51,52,48,47,49,46]
min_t=[30,42,40,44,33,35,37]
avg_t=[45,48,46,40,42,41,40]
plt.plot(days,max_t,label="Max")
plt.plot(days,min_t,label="Min")
plt.plot(days,avg_t,label="Avg")
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.legend(loc="best")
#plt.legend()==plt.legend(loc="best")
```

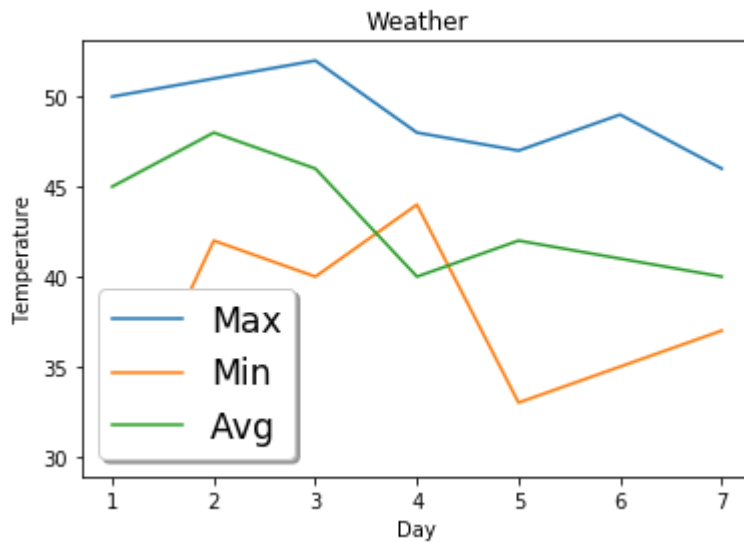
Out[14]: <matplotlib.legend.Legend at 0xa0d9c18>



Legend Properties (Loc, Shadow and fontsize)

```
In [15]: days=[1,2,3,4,5,6,7]
max_t=[50,51,52,48,47,49,46]
min_t=[30,42,40,44,33,35,37]
avg_t=[45,48,46,40,42,41,40]
plt.plot(days,max_t,label="Max")
plt.plot(days,min_t,label="Min")
plt.plot(days,avg_t,label="Avg")
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.legend(loc="lower left",shadow=True,fontsize='xx-large')
```

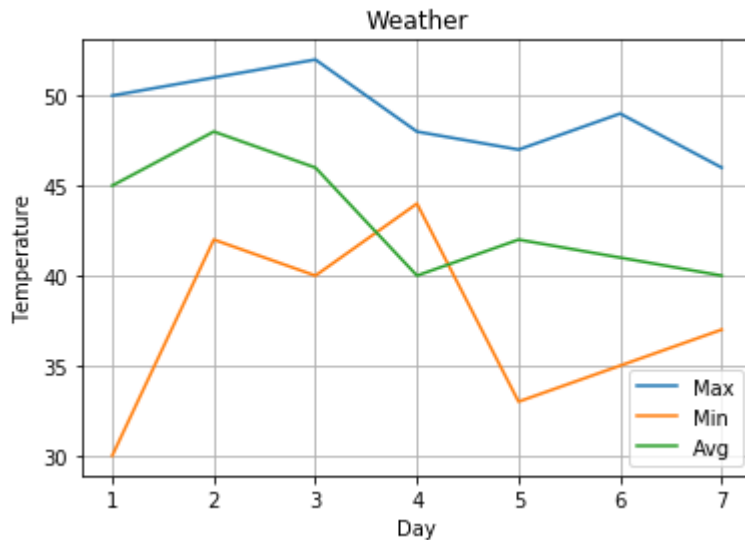
Out[15]: <matplotlib.legend.Legend at 0xa14fcc0>



```
In [16]: # https://matplotlib.org/api/\_as\_gen/matplotlib.pyplot.legend.html
```

Grid

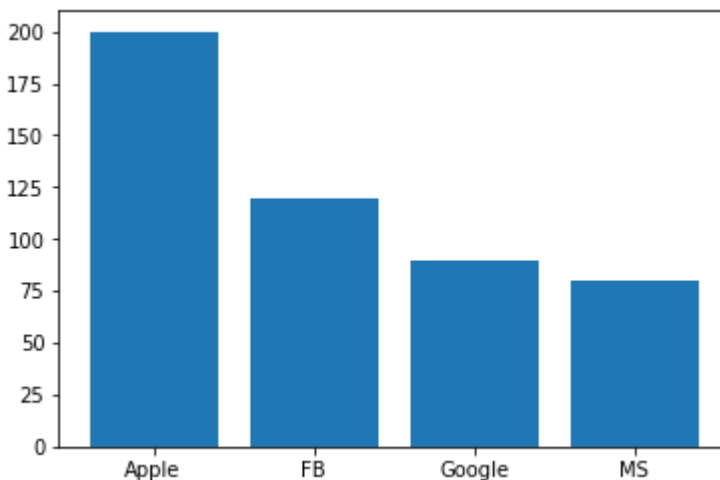
```
In [17]: days=[1,2,3,4,5,6,7]
max_t=[50,51,52,48,47,49,46]
min_t=[30,42,40,44,33,35,37]
avg_t=[45,48,46,40,42,41,40]
plt.plot(days,max_t,label="Max")
plt.plot(days,min_t,label="Min")
plt.plot(days,avg_t,label="Avg")
plt.xlabel('Day')
plt.ylabel('Temperature')
plt.title('Weather')
plt.legend(loc="best")
plt.grid()
```



Bar Graph

```
In [18]: company=['Google','FB','MS','Apple']
revenue=[90,120,80,200]
plt.bar(company,revenue)
```

Out[18]: <Container object of 4 artists>



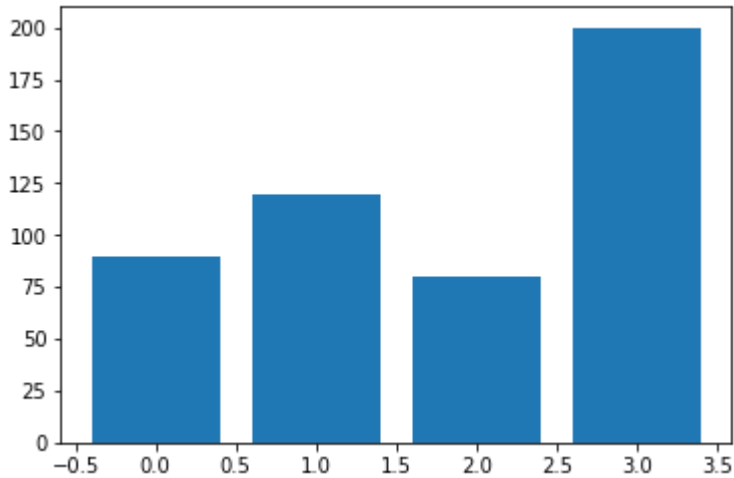
```
In [19]: company=['Google','FB','MS','Apple']  
revenue=[90,120,80,200]
```

```
In [20]: import numpy as np  
ypos=np.arange(len(company))  
ypos
```

```
Out[20]: array([0, 1, 2, 3])
```

```
In [21]: plt.bar(ypos,revenue)
```

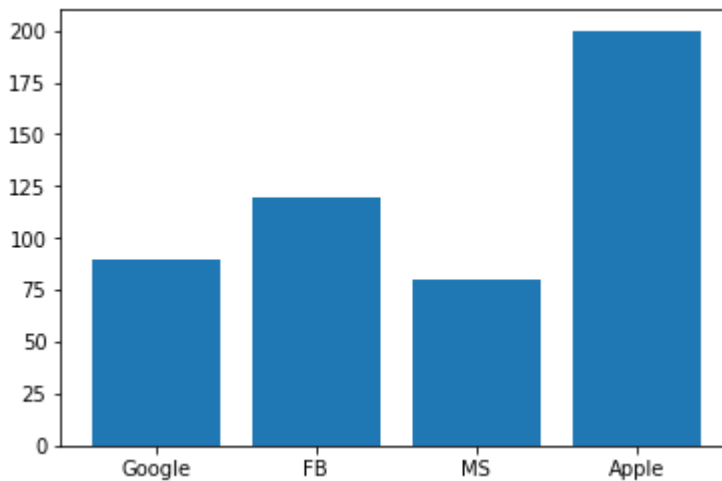
```
Out[21]: <Container object of 4 artists>
```



Solution-Setp-2

```
In [22]: company=['Google','FB','MS','Apple']  
revenue=[90,120,80,200]  
import numpy as np  
ypos=np.arange(len(company))  
plt.xticks(ypos,company)  
plt.bar(ypos,revenue)
```

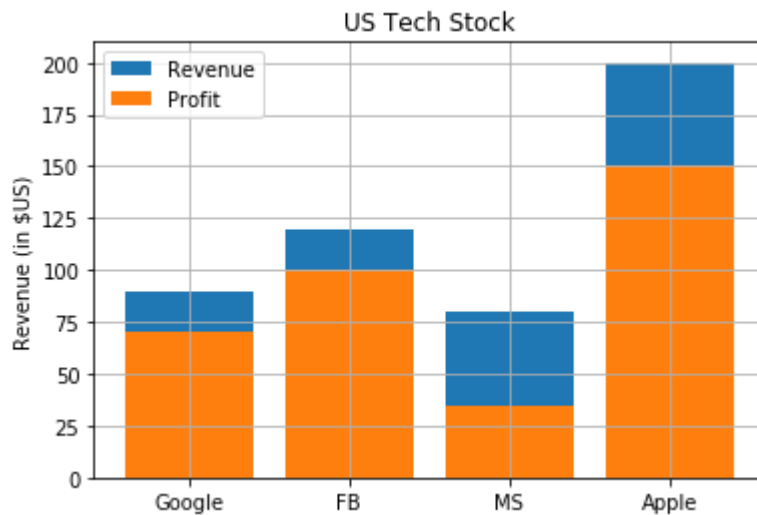
```
Out[22]: <Container object of 4 artists>
```



Multi Bar Graph

```
In [23]: company=['Google','FB','MS','Apple']  
revenue=[90,120,80,200]  
profit=[70,100,35,150]  
xpos=np.arange(len(company))  
plt.xticks(xpos,company)  
plt.bar(xpos,revenue,label="Revenue")  
plt.bar(xpos,profit,label="Profit")  
plt.grid()  
plt.legend(loc="best")  
plt.ylabel('Revenue (in $US)')  
plt.title('US Tech Stock')
```

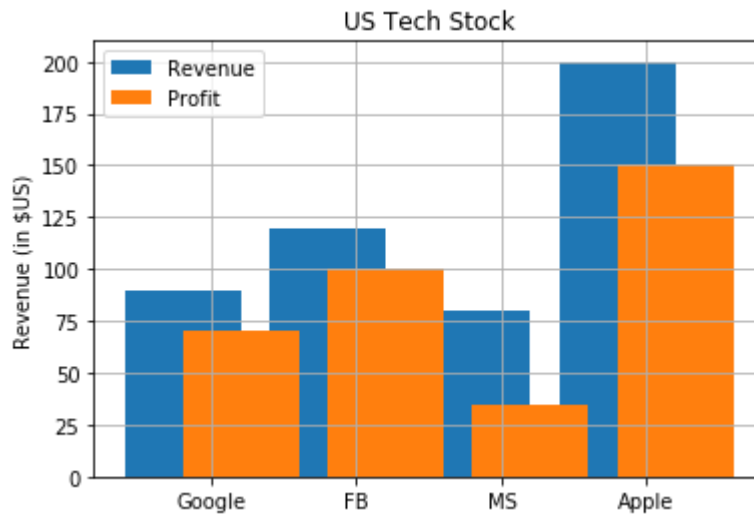
Out[23]: Text(0.5,1,'US Tech Stock')



Multi Bar Graph(Side by Side)

```
In [24]: company=['Google','FB','MS','Apple']
revenue=[90,120,80,200]
profit=[70,100,35,150]
xpos=np.arange(len(company))
plt.xticks(xpos,company)
plt.bar(xpos-0.2,revenue,label="Revenue")
plt.bar(xpos+0.2,profit,label="Profit")
plt.grid()
plt.legend(loc="best")
plt.ylabel('Revenue (in $US)')
plt.title('US Tech Stock')
```

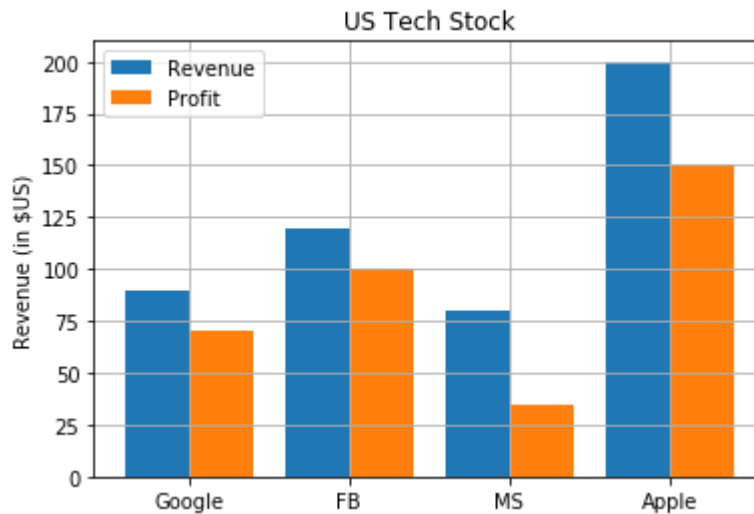
Out[24]: Text(0.5,1,'US Tech Stock')



Solution

```
In [25]: company=['Google','FB','MS','Apple']
revenue=[90,120,80,200]
profit=[70,100,35,150]
xpos=np.arange(len(company))
plt.xticks(xpos,company)
plt.bar(xpos-0.2,revenue,width=0.4,label="Revenue")
plt.bar(xpos+0.2,profit,width=0.4,label="Profit")
plt.grid()
plt.legend(loc="best")
plt.ylabel('Revenue (in $US)')
plt.title('US Tech Stock')
```

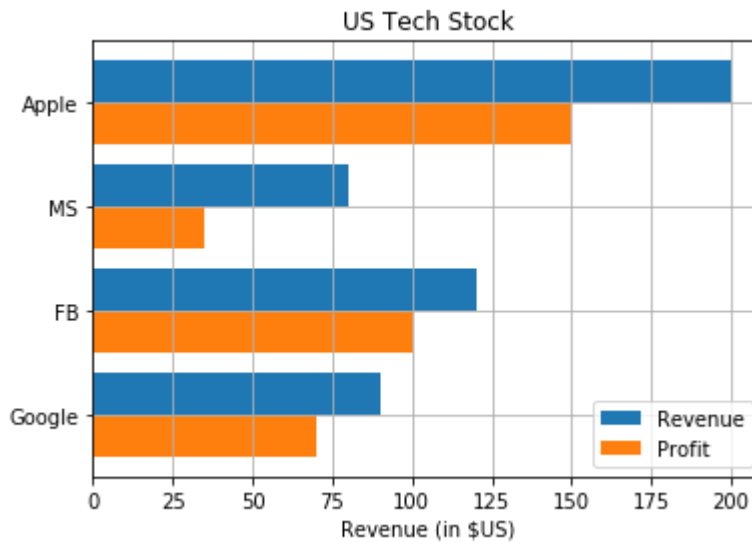
Out[25]: Text(0.5,1,'US Tech Stock')



Horizontal Bar Graph(Side by Side)

```
In [26]: company=['Google','FB','MS','Apple']
revenue=[90,120,80,200]
profit=[70,100,35,150]
ypos=np.arange(len(company))
plt.yticks(ypos,company)
plt.barh(ypos+0.2,revenue,height=0.4,label="Revenue")
plt.barh(ypos-0.2,profit,height=0.4,label="Profit")
plt.grid()
plt.legend(loc="best")
plt.xlabel('Revenue (in $US)')
plt.title('US Tech Stock')
```

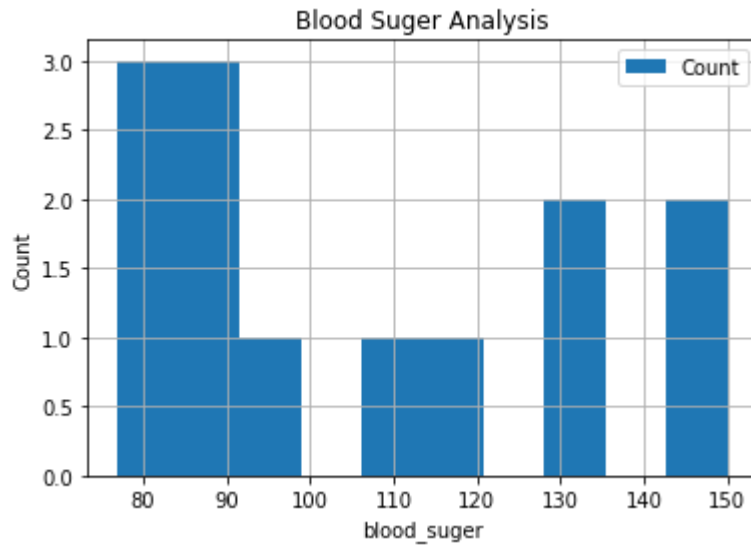
Out[26]: Text(0.5,1,'US Tech Stock')



Histograms


```
In [27]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count")
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

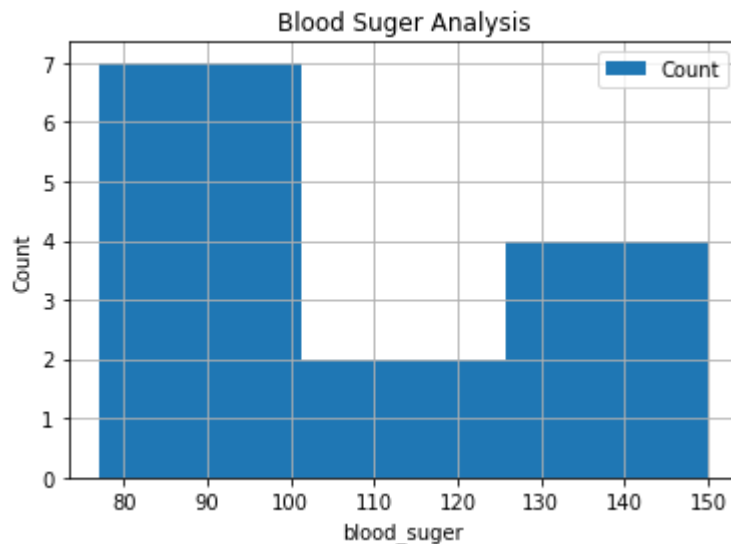
Out[27]: Text(0.5,1,'Blood Suger Analysis')



Bins

```
In [28]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count",bins=3)
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

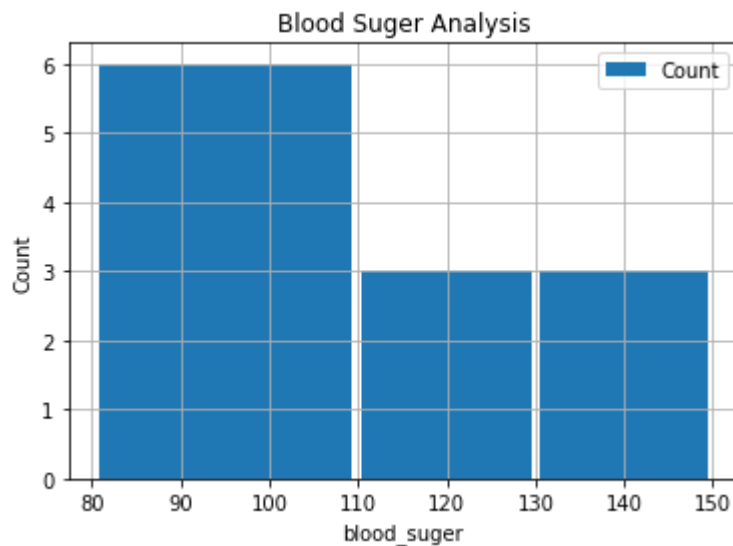
Out[28]: Text(0.5,1,'Blood Suger Analysis')



customized bins

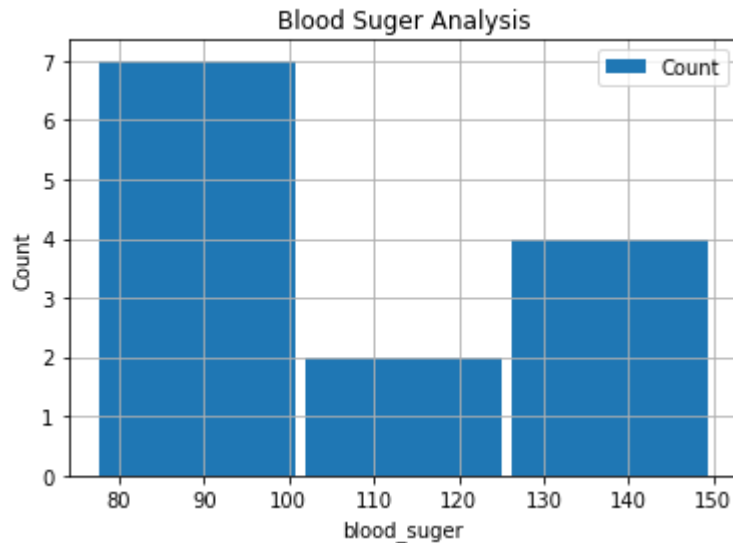
```
In [29]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count",bins=[80,110,130,150],rwidth=0.95)
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

Out[29]: Text(0.5,1,'Blood Suger Analysis')

**rwidth**

```
In [30]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count",bins=3,rwidth=0.95)
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

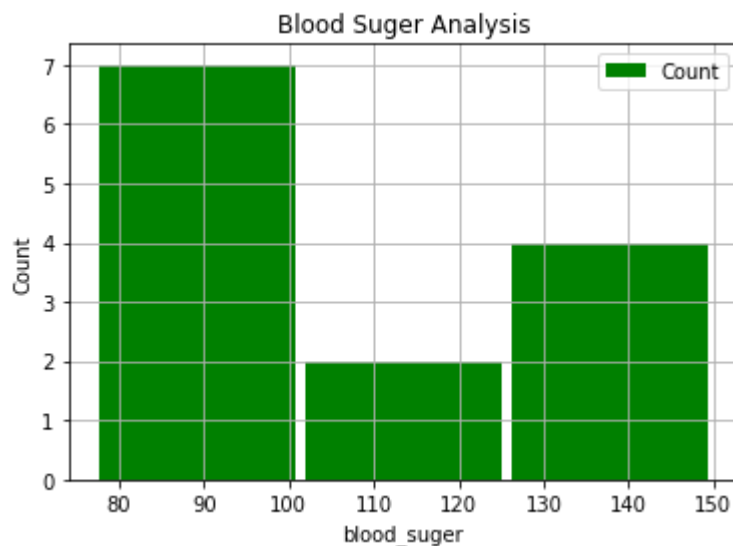
Out[30]: Text(0.5,1,'Blood Suger Analysis')



color

```
In [31]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count",bins=3,rwidth=0.95,color='green')
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

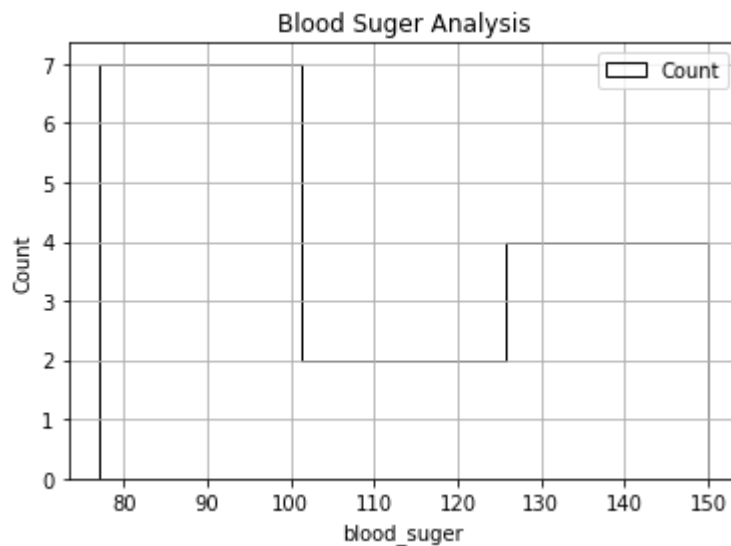
Out[31]: Text(0.5,1,'Blood Suger Analysis')



histtype='step'

```
In [32]: blood_suger=[113,85,90,150,149,88,93,115,135,80,77,82,129]
plt.hist(blood_suger,label="Count",bins=3,rwidth=0.95,color='black',histtype='ste
plt.grid()
plt.legend(loc="best")
plt.xlabel('blood_suger')
plt.ylabel('Count')
plt.title('Blood Suger Analysis')
```

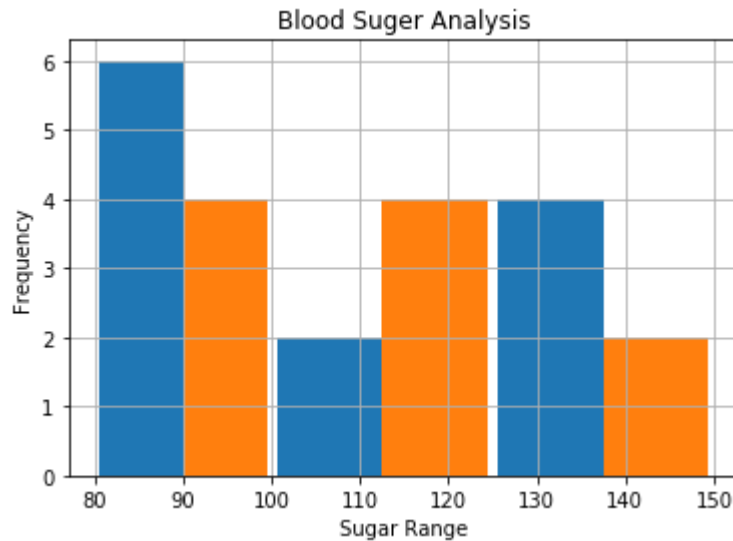
Out[32]: Text(0.5,1,'Blood Suger Analysis')



Multi Bar Histograms

```
In [33]: blood_suger_men=[113,85,90,150,149,88,93,115,135,80,77,82,129]
blood_suger_women=[67,98,89,120,133,150,84,69,89,79,120,112,100]
plt.hist([blood_suger_men,blood_suger_women],bins=[80,100,125,150],rwidth=0.95)
plt.grid()
plt.xlabel('Sugar Range')
plt.ylabel('Frequency')
plt.title('Blood Suger Analysis')
```

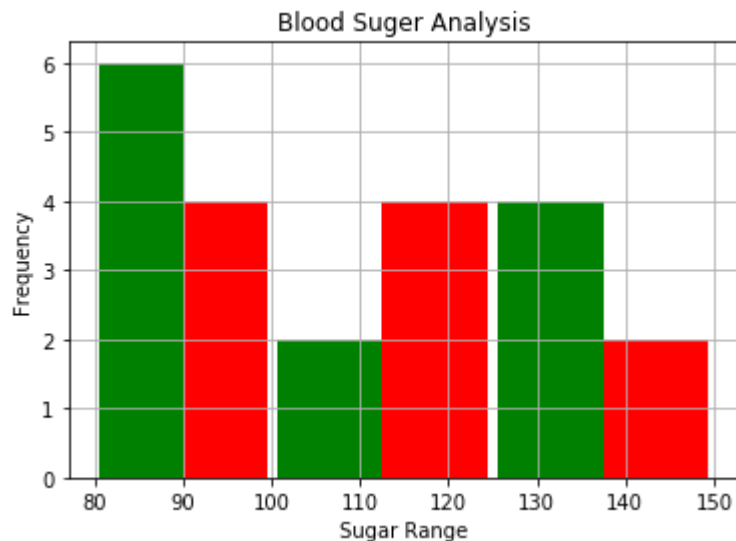
Out[33]: Text(0.5,1,'Blood Suger Analysis')



Color

```
In [34]: blood_suger_men=[113,85,90,150,149,88,93,115,135,80,77,82,129]
blood_suger_women=[67,98,89,120,133,150,84,69,89,79,120,112,100]
plt.hist([blood_suger_men,blood_suger_women],bins=[80,100,125,150],rwidth=0.95,color=[0,1])
plt.grid()
plt.xlabel('Sugar Range')
plt.ylabel('Frequency')
plt.title('Blood Suger Analysis')
```

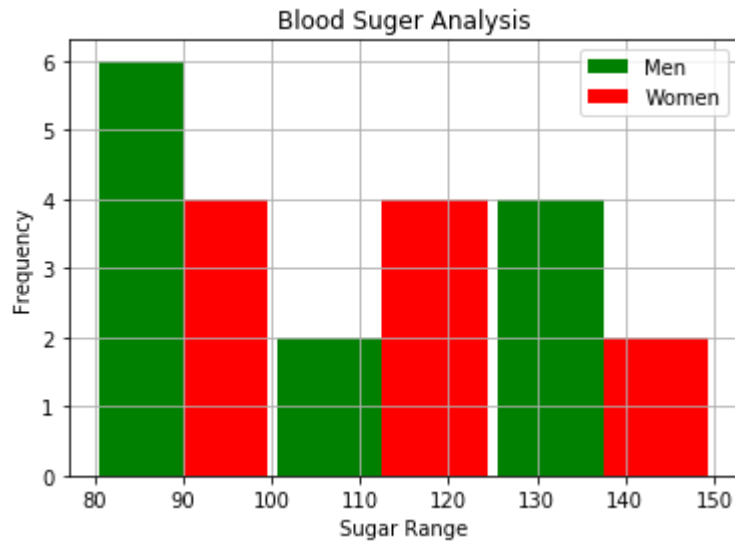
Out[34]: Text(0.5,1,'Blood Suger Analysis')



Label

```
In [35]: blood_suger_men=[113,85,90,150,149,88,93,115,135,80,77,82,129]
blood_suger_women=[67,98,89,120,133,150,84,69,89,79,120,112,100]
plt.hist([blood_suger_men,blood_suger_women],bins=[80,100,125,150],rwidth=0.95,co
plt.grid()
plt.xlabel('Sugar Range')
plt.ylabel('Frequency')
plt.title('Blood Suger Analysis')
plt.legend(loc="best")
```

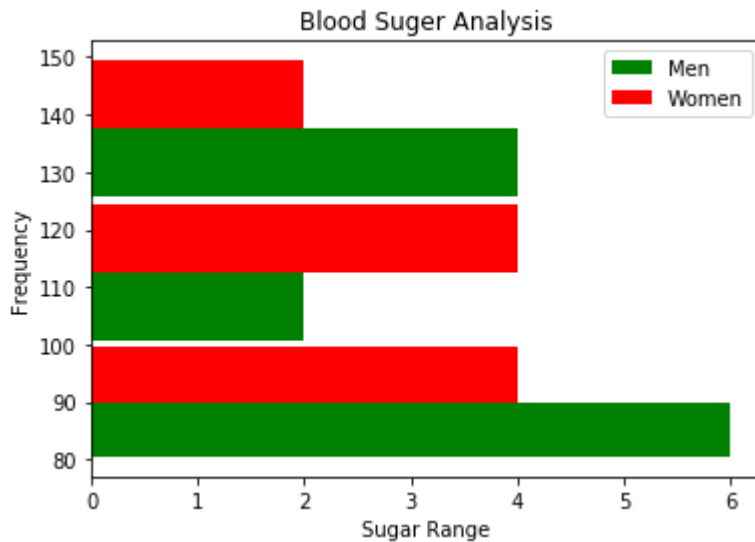
Out[35]: <matplotlib.legend.Legend at 0xb7ccf60>



Horizontal Histograms

```
In [36]: blood_suger_men=[113,85,90,150,149,88,93,115,135,80,77,82,129]
blood_suger_women=[67,98,89,120,133,150,84,69,89,79,120,112,100]
plt.xlabel('Sugar Range')
plt.ylabel('Frequency')
plt.title('Blood Suger Analysis')
plt.hist([blood_suger_men,blood_suger_women],bins=[80,100,125,150],rwidth=0.95,color=[
    'Men','Women'],orientation='horizontal')
plt.legend()
```

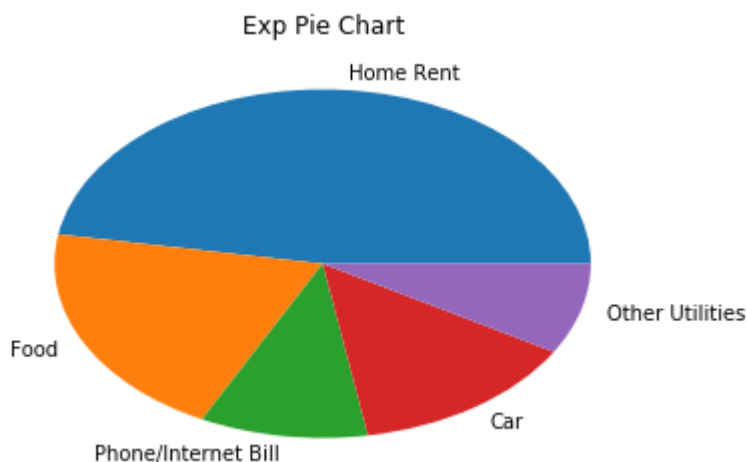
Out[36]: <matplotlib.legend.Legend at 0xb8d7908>



Pie Chart

```
In [37]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.pie(exp_vls,labels=exp_labels)
plt.title('Exp Pie Chart')
```

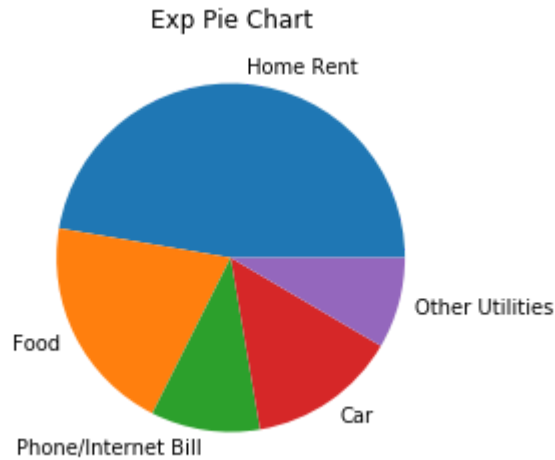
Out[37]: Text(0.5,1,'Exp Pie Chart')



Adj. Pie Chart axis

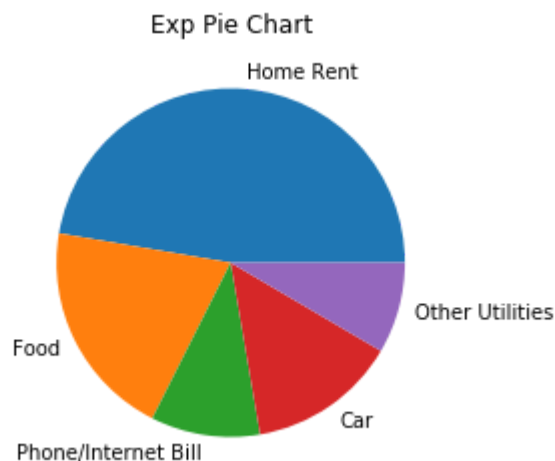
```
In [38]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels)
plt.title('Exp Pie Chart')
```

Out[38]: Text(0.5,1,'Exp Pie Chart')



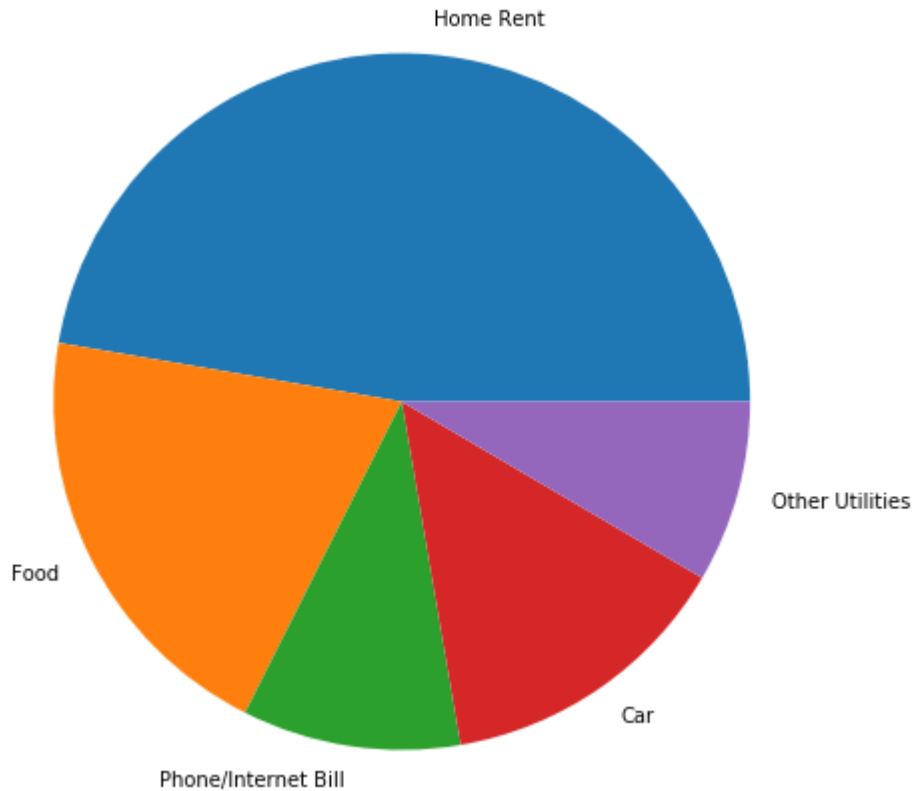
Pie Chart without showing Calculation

```
In [39]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels)
plt.title('Exp Pie Chart')
plt.show()
```



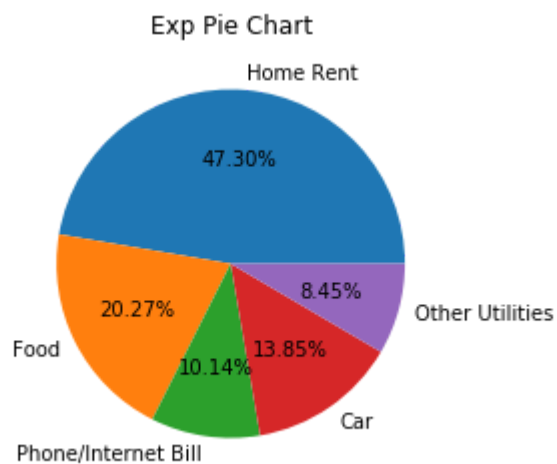
Pie Chart (radius)


```
In [40]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,radius=2)
plt.show()
```



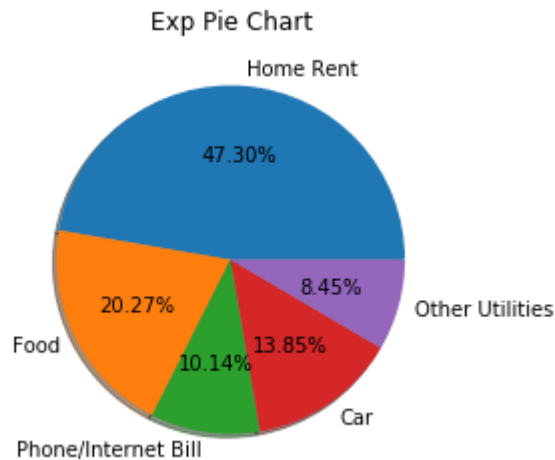
Pie Chart (Shows %)

```
In [41]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%')
plt.title('Exp Pie Chart')
plt.show()
```



Pie Chart (Set Shadow)

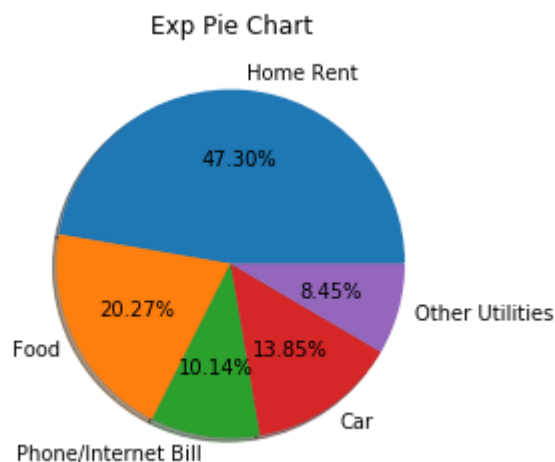
```
In [42]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%',shadow=True)
plt.title('Exp Pie Chart')
plt.show()
```



explode

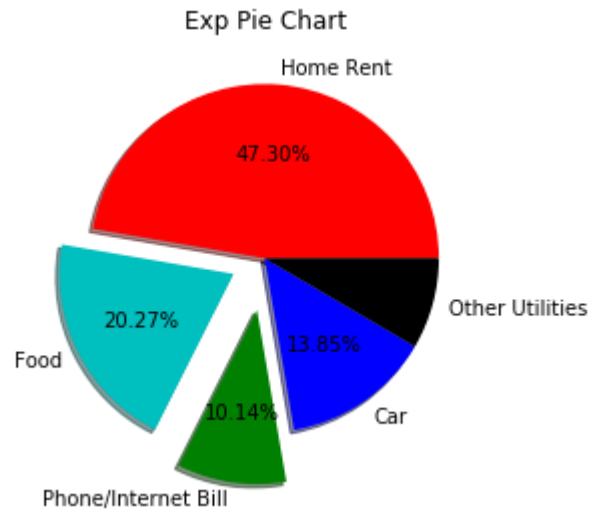
Example-1

```
In [43]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%',shadow=True,explode=(0,0,0,0,0))
plt.title('Exp Pie Chart')
plt.show()
```



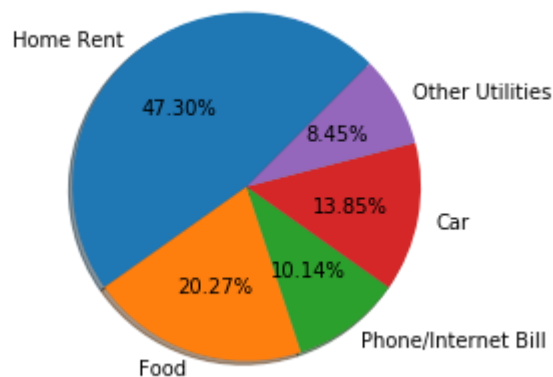
Example-2

```
In [44]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,
        autopct='%0.2f%%',
        shadow=True,
        explode=(0,0.2,0.3,0,0),
        colors=['r','c','g','b','k'])
plt.title('Exp Pie Chart')
plt.show()
```



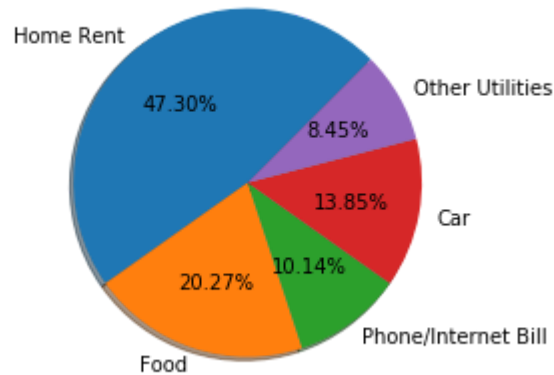
startangle

```
In [45]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%',shadow=True,explode=(0,0,0,0,0),
plt.show())
```



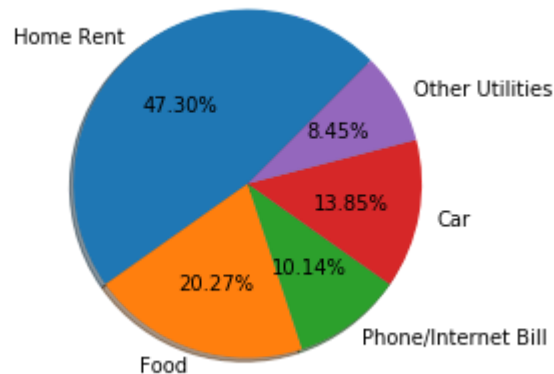
Save Fig. in Png File

```
In [46]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%',shadow=True,explode=(0,0,0,0,0))
plt.savefig('piechart.png')
```



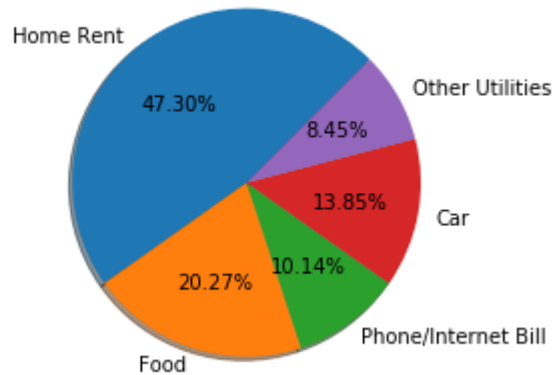
Save Fig. in Png File(bbox_inches='tight')

```
In [47]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%',shadow=True,explode=(0,0,0,0,0))
plt.savefig('piechart1.png',bbox_inches='tight')
```



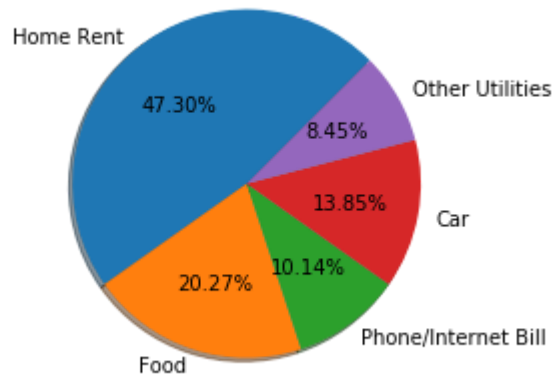
Save Fig. in Png File(pad_inches)

```
In [48]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%',shadow=True,explode=(0,0,0,0,0))
plt.savefig('piechart2.png',bbox_inches='tight',pad_inches=2)
```



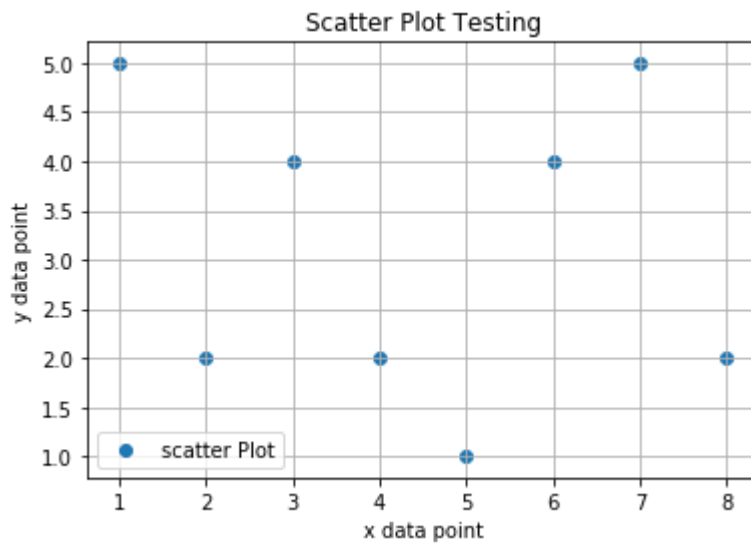
Save Fig. in Png File(transparent)

```
In [49]: exp_vls=[1400,600,300,410,250]
exp_labels=['Home Rent','Food','Phone/Internet Bill','Car','Other Utilities']
plt.axis("equal")
plt.pie(exp_vls,labels=exp_labels,autopct='%0.2f%%',shadow=True,explode=(0,0,0,0,0))
plt.savefig('piechart3.png',bbox_inches='tight',pad_inches=2,transparent=True)
```



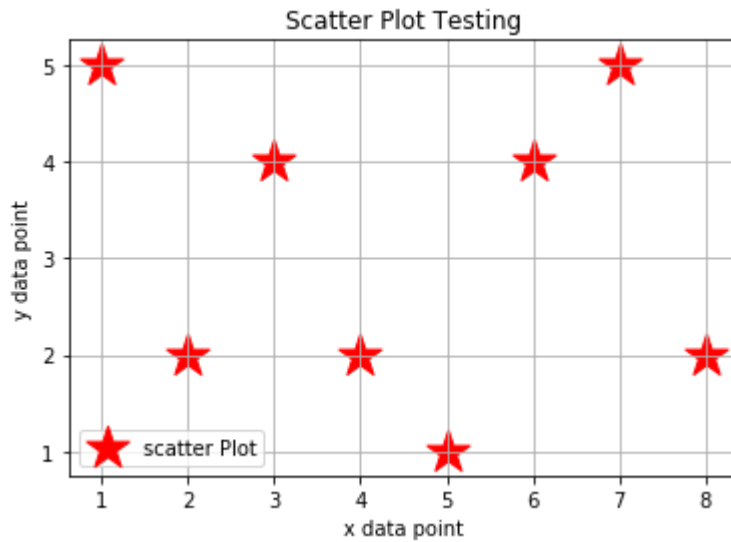
Scatter Plot

```
In [50]: x=[1,2,3,4,5,6,7,8]
y=[5,2,4,2,1,4,5,2]
plt.scatter(x,y,label='scatter Plot')
plt.legend()
plt.xlabel('x data point')
plt.ylabel('y data point')
plt.title('Scatter Plot Testing')
plt.grid()
plt.show()
```



Scatter Plot(Color,Marker and size)

```
In [51]: x=[1,2,3,4,5,6,7,8]
y=[5,2,4,2,1,4,5,2]
plt.scatter(x,y,label='scatter Plot',color='red',marker="*",s=500)
plt.legend()
plt.xlabel('x data point')
plt.ylabel('y data point')
plt.title('Scatter Plot Testing')
plt.grid()
plt.show()
```

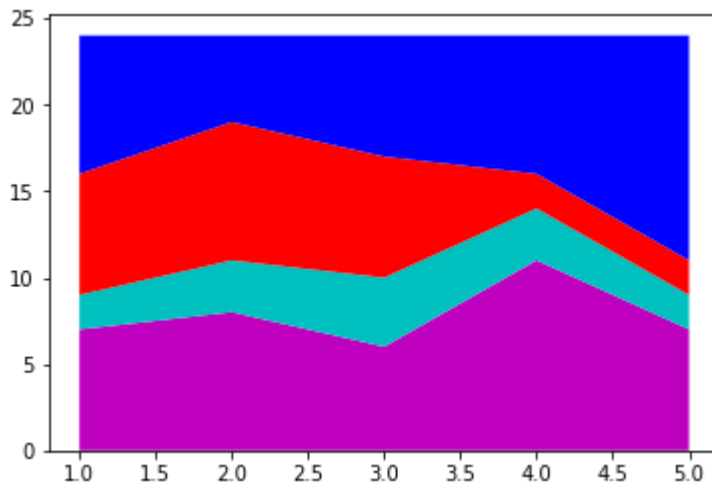


matplotlib markers: https://matplotlib.org/api/markers_api.html
(https://matplotlib.org/api/markers_api.html)

Stack Plots

```
In [52]: days=[1,2,3,4,5]
         sleeping=[7,8,6,11,7]
         eating=[2,3,4,3,2]
         working=[7,8,7,2,2]
         playing=[8,5,7,8,13]
         plt.stackplot(days, sleeping,eating,working,playing, colors=['m','c','r','b'])
```

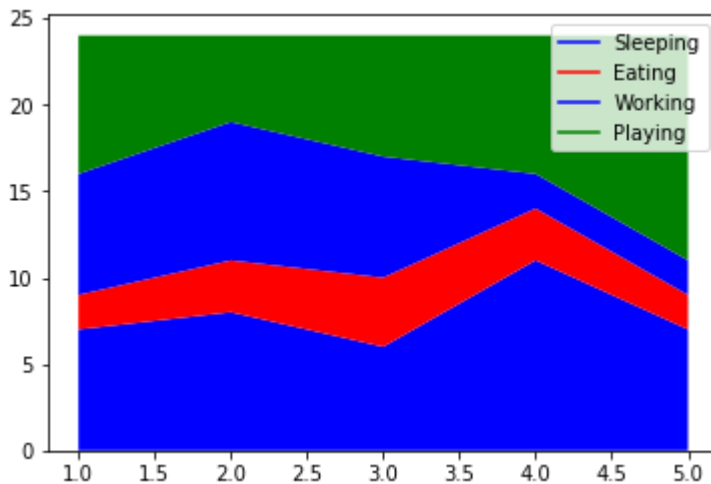
```
Out[52]: [<matplotlib.collections.PolyCollection at 0xbb4b3c8>,
         <matplotlib.collections.PolyCollection at 0xbbae470>,
         <matplotlib.collections.PolyCollection at 0xbbaecc0>,
         <matplotlib.collections.PolyCollection at 0xbbaeef0>]
```



Solution


```
In [53]: days=[1,2,3,4,5]
sleeping=[7,8,6,11,7]
eating=[2,3,4,3,2]
working=[7,8,7,2,2]
playing=[8,5,7,8,13]
plt.plot([],[],color='b',label='Sleeping')
plt.plot([],[],color='r',label='Eating')
plt.plot([],[],color='b',label='Working')
plt.plot([],[],color='g',label='Playing')
plt.stackplot(days, sleeping,eating,working,playing, colors=['b','r','b','g'])
plt.legend()
```

Out[53]: <matplotlib.legend.Legend at 0xba72160>



Linewidth

```
In [54]: days=[1,2,3,4,5]
sleeping=[7,8,6,11,7]
eating=[2,3,4,3,2]
working=[7,8,7,2,2]
playing=[8,5,7,8,13]
plt.plot([],[],color='b',label='Sleeping',linewidth=5)
plt.plot([],[],color='r',label='Eating',linewidth=5)
plt.plot([],[],color='b',label='Working',linewidth=5)
plt.plot([],[],color='g',label='Playing',linewidth=5)
plt.stackplot(days, sleeping,eating,working,playing, colors=['b','r','b','g'])
plt.legend()
```

Out[54]: <matplotlib.legend.Legend at 0xb9ff550>

