matplotlib

August 28, 2023

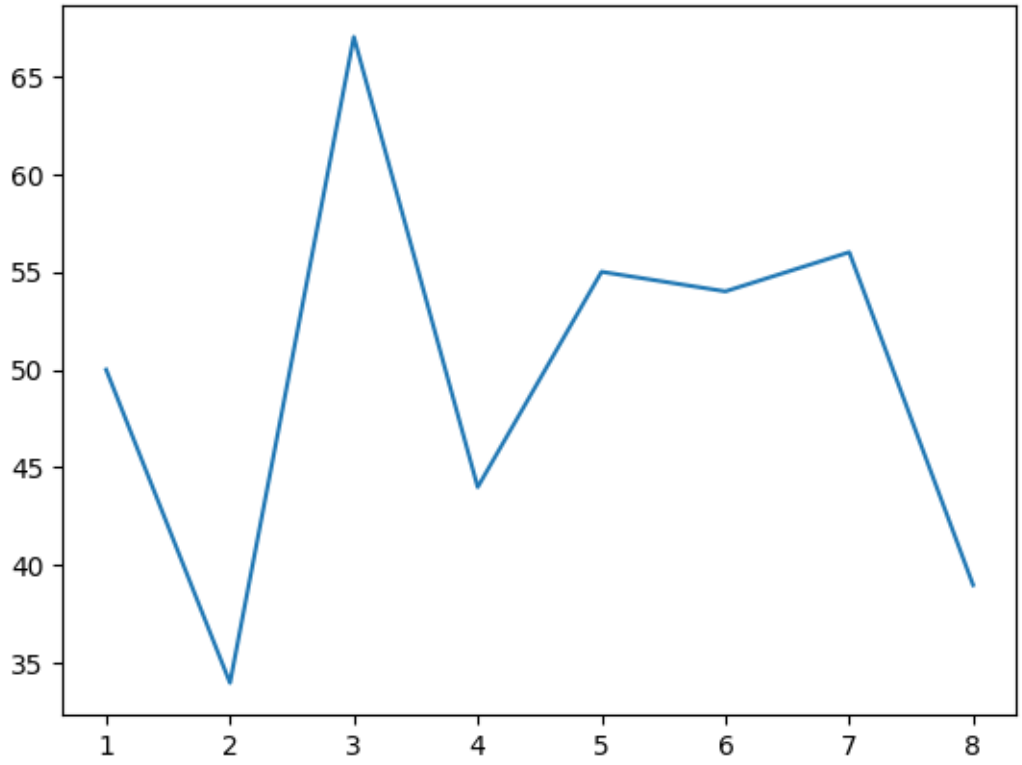
1 Matpoltlib

1.1 Importing matplotlib pyplot

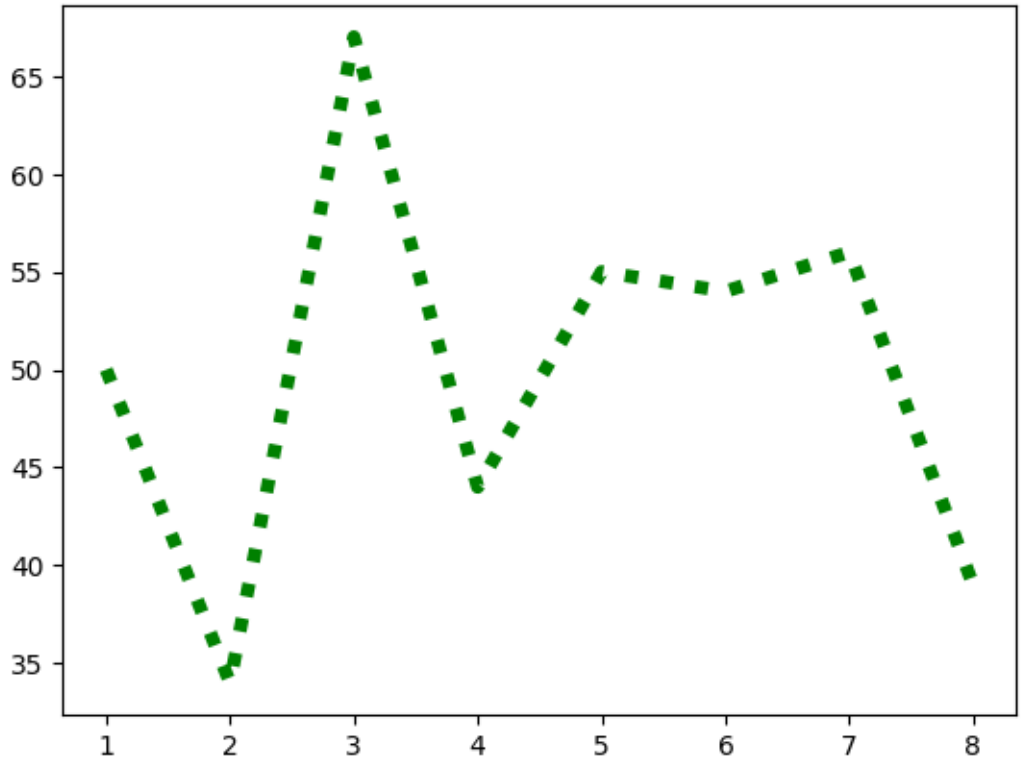
[1]:
```
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
```

1.2 Simple plot

[2]:
```
x = [1,2,3,4,5,6,7,8]
y = [50 , 34, 67, 44, 55,54, 56,39]
plt.plot(x , y)
plt.show()
```



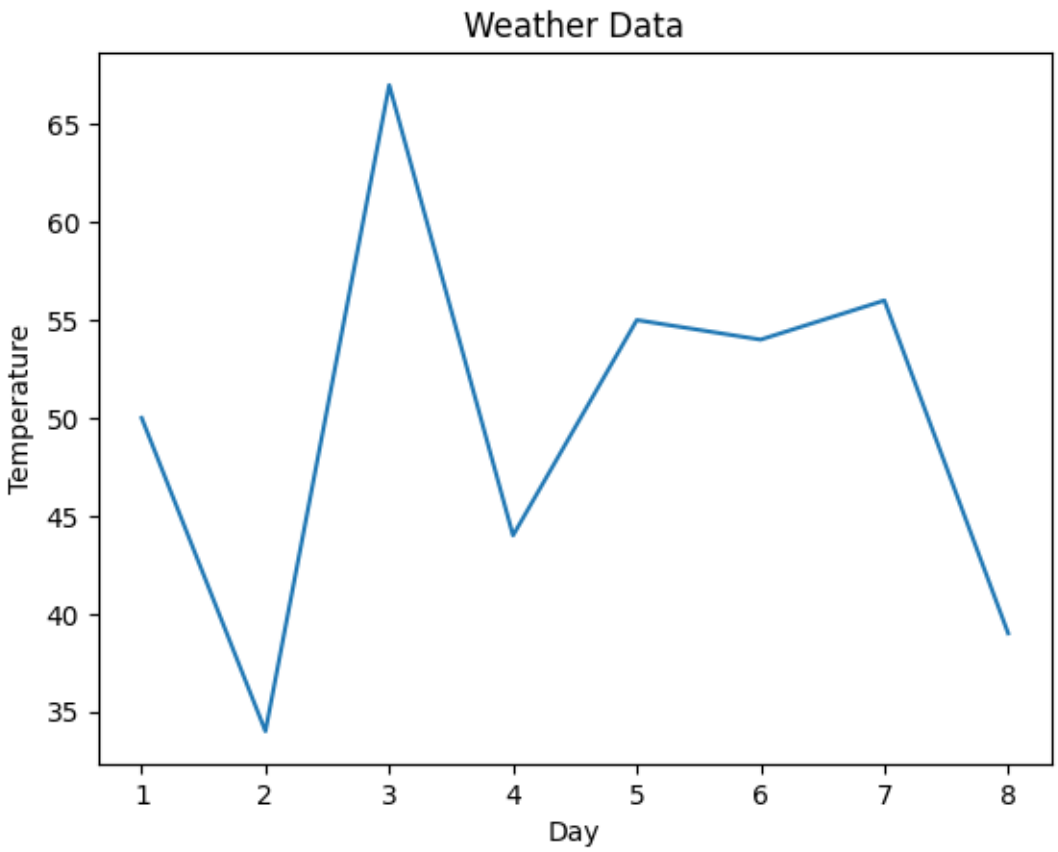
[3]:
```
x = [1,2,3,4,5,6,7,8]
y = [50 , 34, 67, 44, 55,54, 56,39]
plt.plot(x , y , color = "green" , linewidth=5 , linestyle = "dotted")
plt.show()
```



1.3 Lable and Title

[4]:
```
plt.xlabel("Day")
plt.ylabel("Temperature")
plt.title("Weather Data")
plt.plot(x ,y)
```

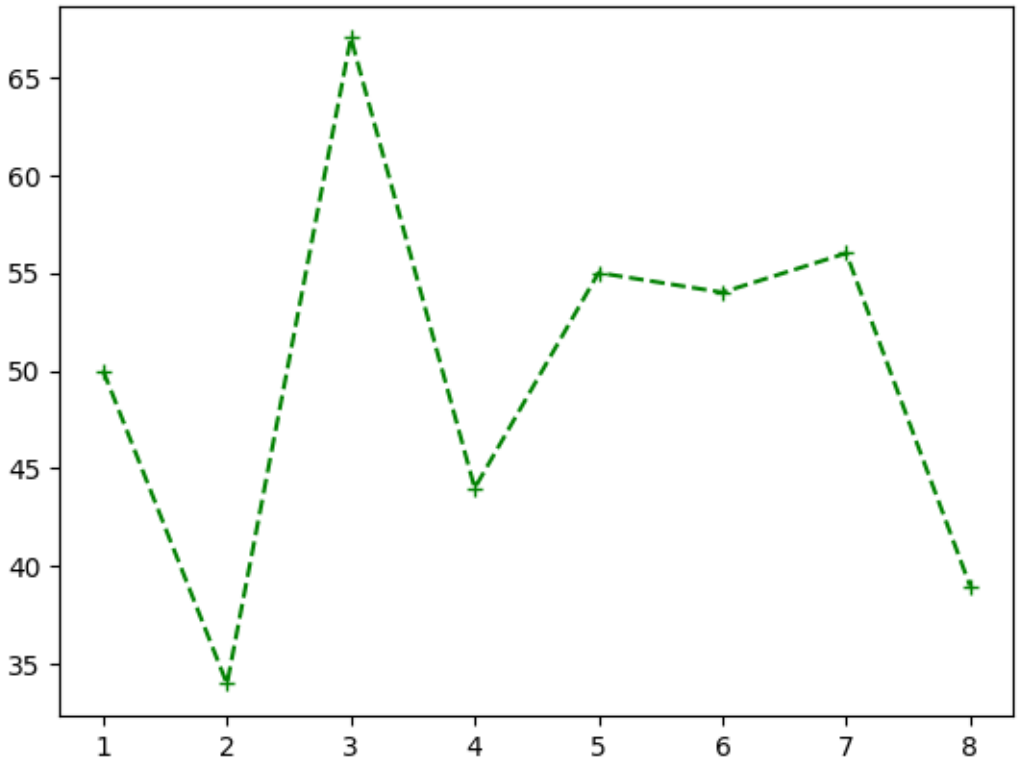
[4]: [<matplotlib.lines.Line2D at 0x7f2697f0a290>]



1.4 Format String

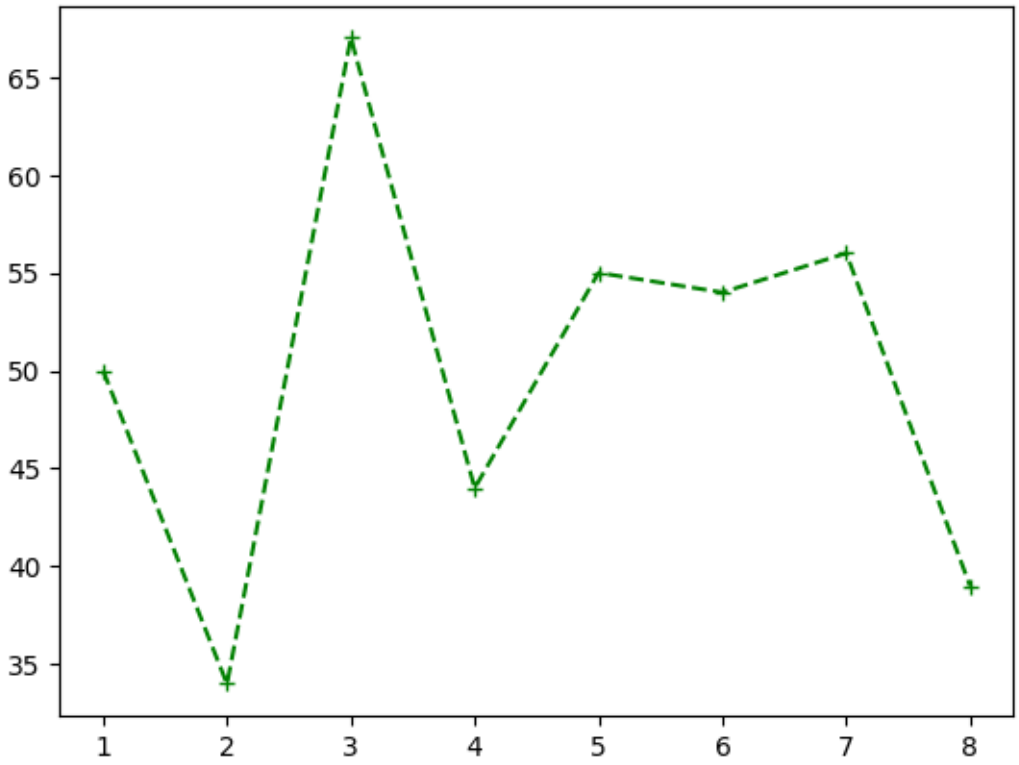
[5]:
```
plt.plot(x ,y , "g--+")
# g : green
# + : point indicator
# -- : doted
# and so on in documantation....
```

[5]: [<matplotlib.lines.Line2D at 0x7f2697d59030>]



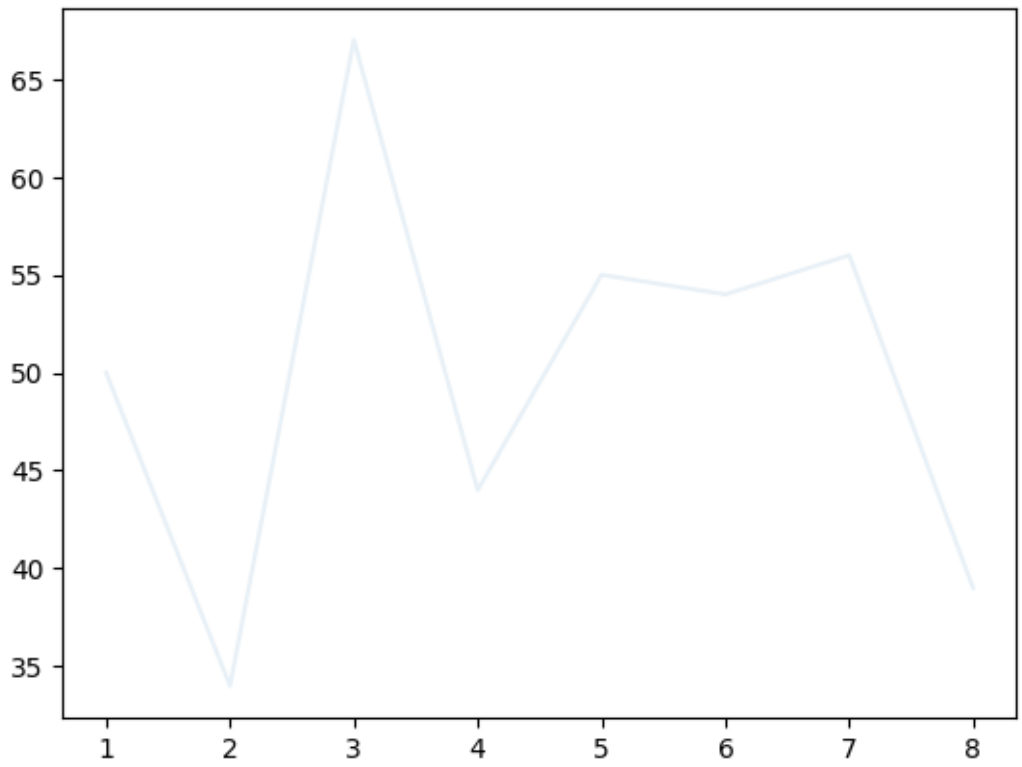
[6]:
```
plt.plot(x , y , linestyle = "--" , color = "green" , marker = "+")
# same output
# makersize --> for set size of maker
```

[6]: [<matplotlib.lines.Line2D at 0x7f2697dbfbb0>]



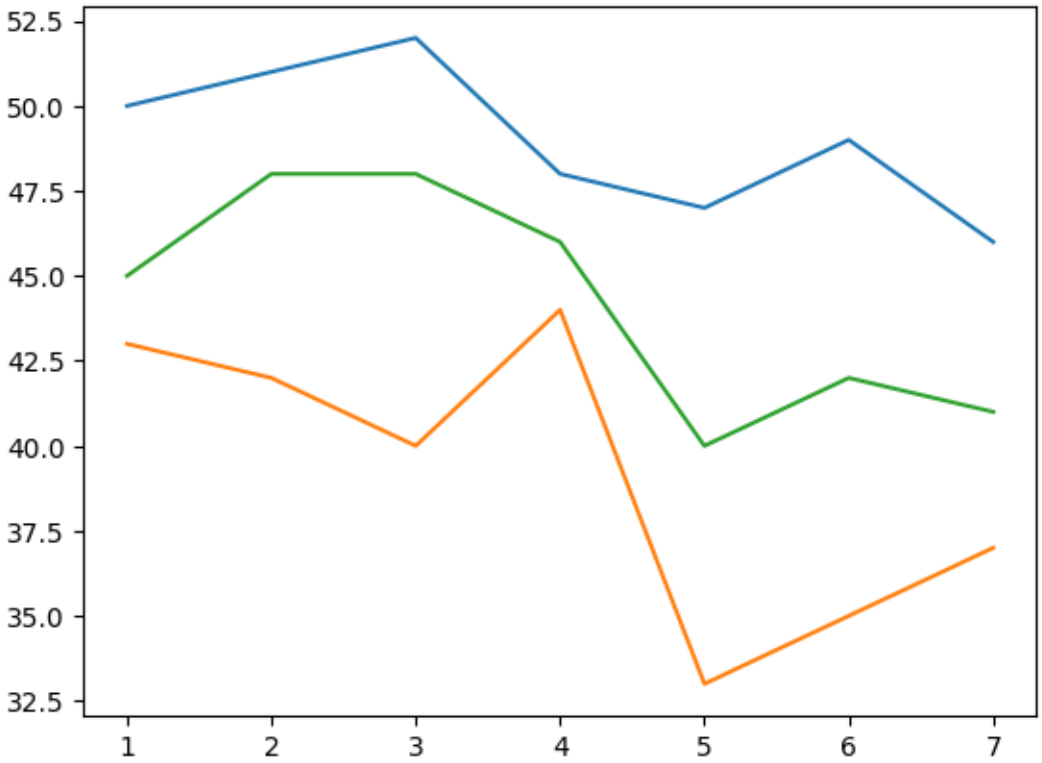
[7]:
```
plt.plot(x , y , alpha = 0.1) # alhpa --> transparency 0 - 1
# 0 --> invisible
# 1 --> full
# There are so many porperties in plot documantation
```

[7]: [<matplotlib.lines.Line2D at 0x7f2697c4ef20>]



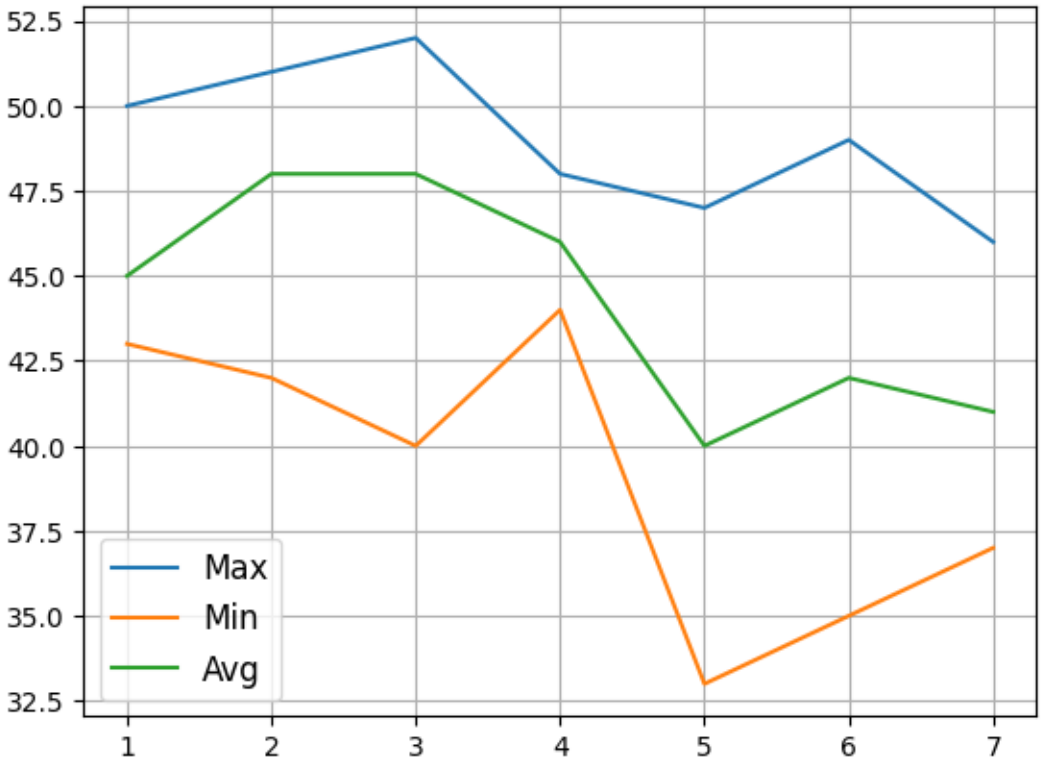
1.5 Multiple graps

[8]:
```
# Data
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=[45,48,48,46,40,42,41]
# Graps
plt.plot(days , max_t)     # x axis = days and y axis = max_t
plt.plot(days , min_t)     # x axis = days and y axis = min_t
plt.plot(days , avg_t)     # x axis = days and y axis = avg_t
plt.show()
```



1.6 Create Lable

[9]:
```
plt.plot(days , max_t , label = "Max")     # set a label Max
plt.plot(days , min_t , label = "Min")     # set a label Min
plt.plot(days , avg_t , label = "Avg")     # set a label Avg
# It will not display until we use:
plt.legend()
# Change location of legend:
plt.legend(loc = "best")        # set in best place automatically
plt.legend(loc = "lower left" , fontsize = "large") # set in lower left and␣
 ↪font size large

# Greading:
plt.grid()   # make grid lines in plot
```



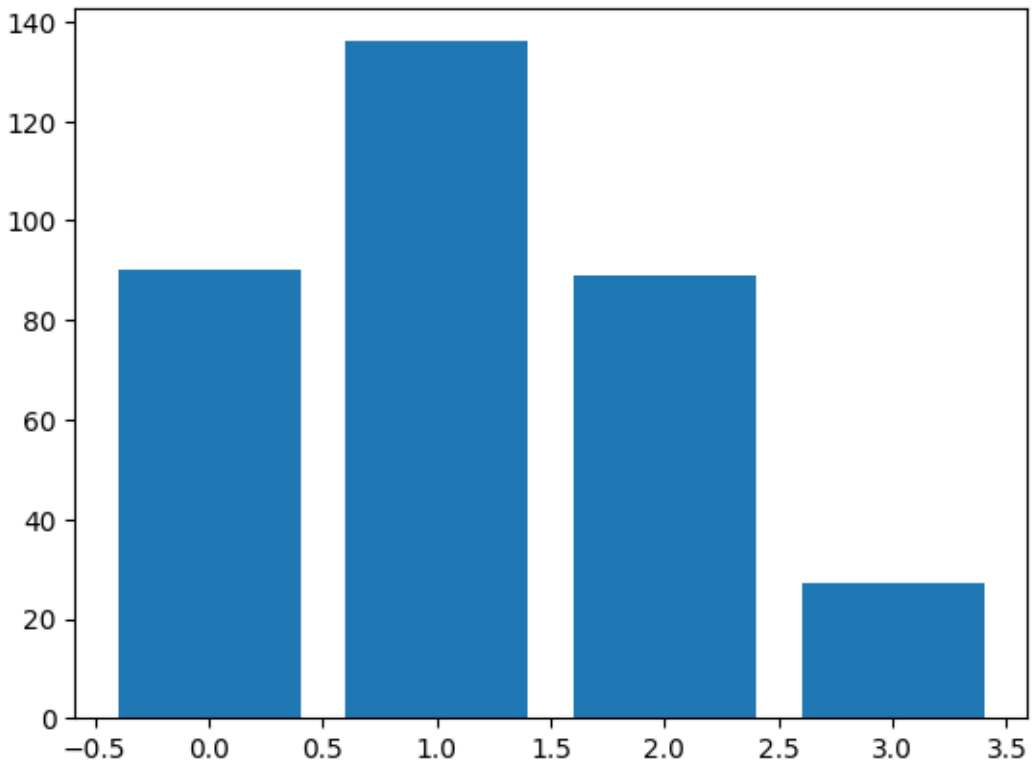
1.7 Bar Chart

[10]:
```
company=['GOOGL','AMZN','MSFT','FB']
revenue=[90,136,89,27]
profit = [40 , 2 , 32 , 12]
xposition = np.arange(len(company))
print(xposition)
```

```
[0 1 2 3]
```

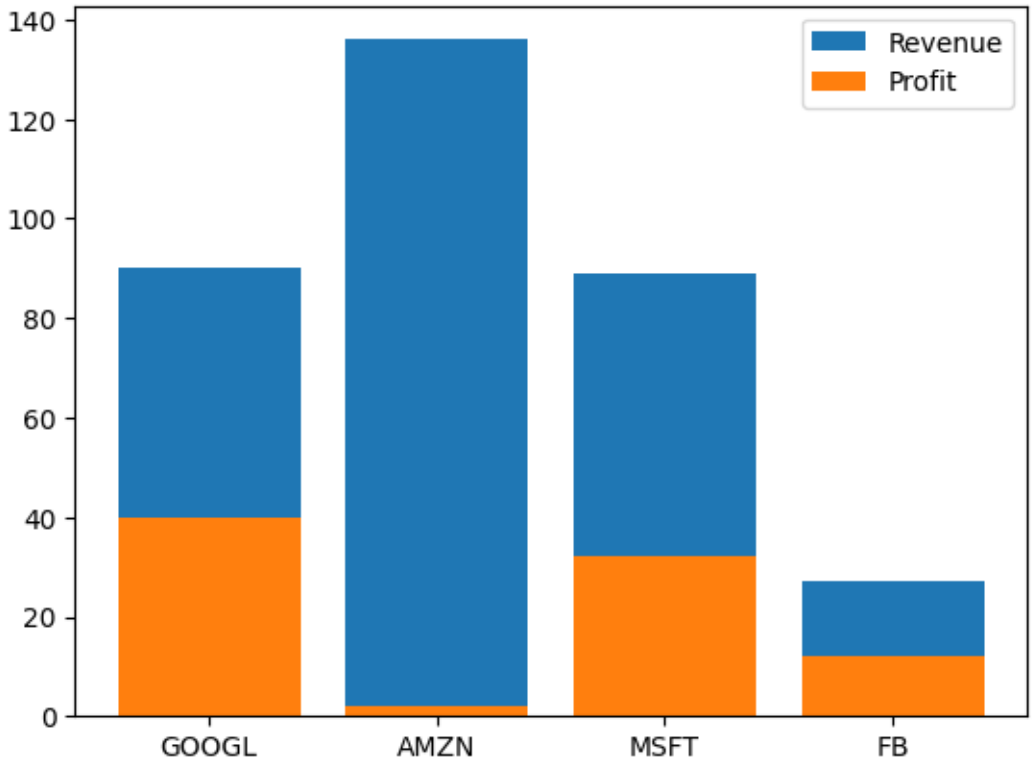
[11]:
```
plt.bar(xposition , revenue)
```

[11]:
```
<BarContainer object of 4 artists>
```



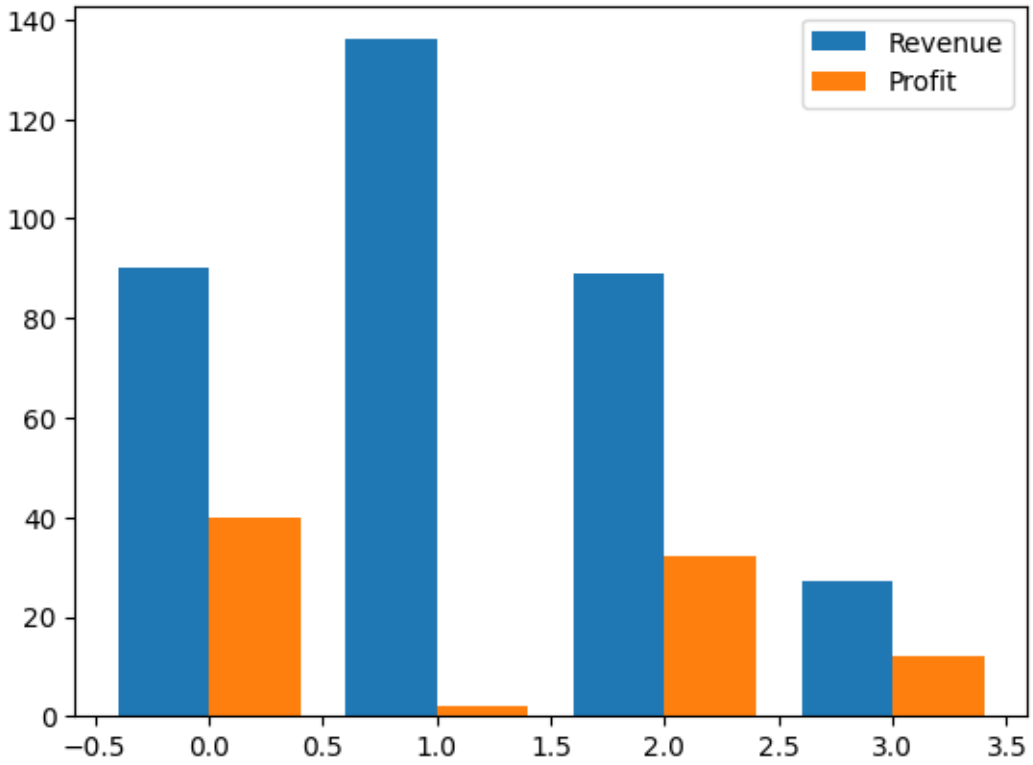
[12]:
```
# Replace 1 , 2 , 3 etc to lables:
plt.bar(xposition , revenue, label = "Revenue")
plt.xticks(xposition , company , label = "Coumpany")

# Plot 2 bar chart:
plt.bar(xposition , profit , label= "Profit")  # new bar chart profit
plt.legend()  # print label
```

[12]:
```
<matplotlib.legend.Legend at 0x7f2697c4f1c0>
```



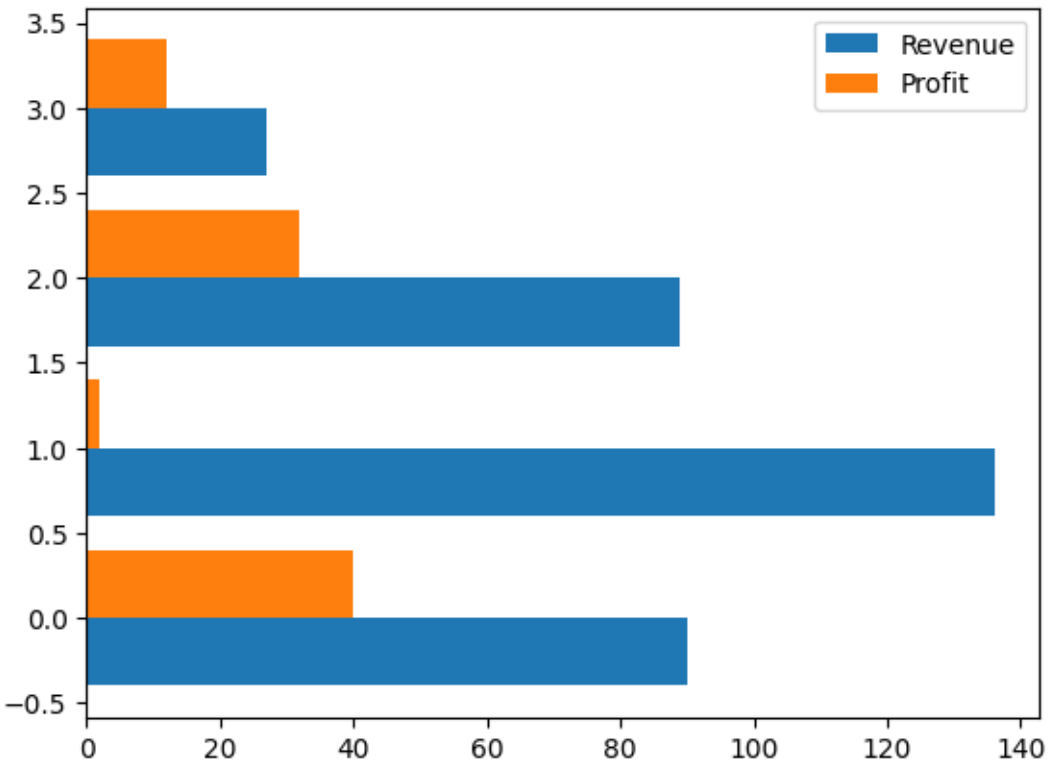
[13]:
```
# Plot side by side:
plt.bar(xposition - 0.2 , revenue, label = "Revenue" , width=0.4)
plt.bar(xposition + 0.2 , profit , label= "Profit" , width= 0.4)
plt.legend()
```

[13]: <matplotlib.legend.Legend at 0x7f2697d9c0a0>



[14]:
```
# Horizontal bar chart:
plt.barh(xposition - 0.2 , revenue, label = "Revenue" , height=0.4)
plt.barh(xposition + 0.2 , profit , label= "Profit" , height= 0.4)
plt.legend()
```

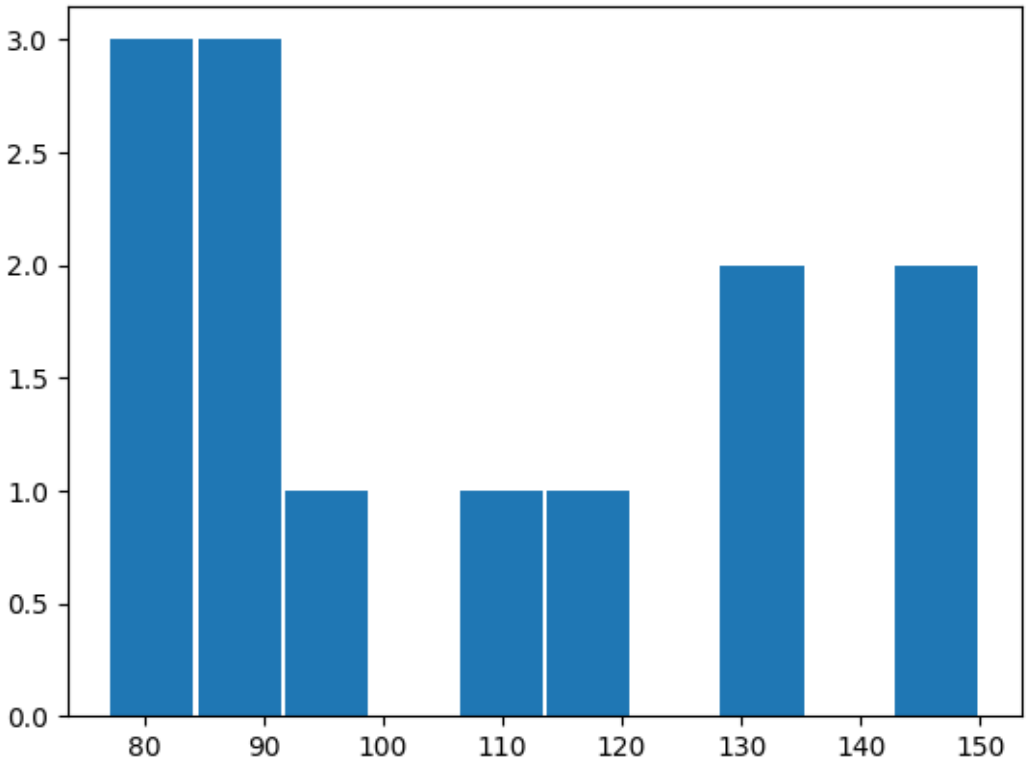
[14]: <matplotlib.legend.Legend at 0x7f269ff7c100>



1.8 Histogram

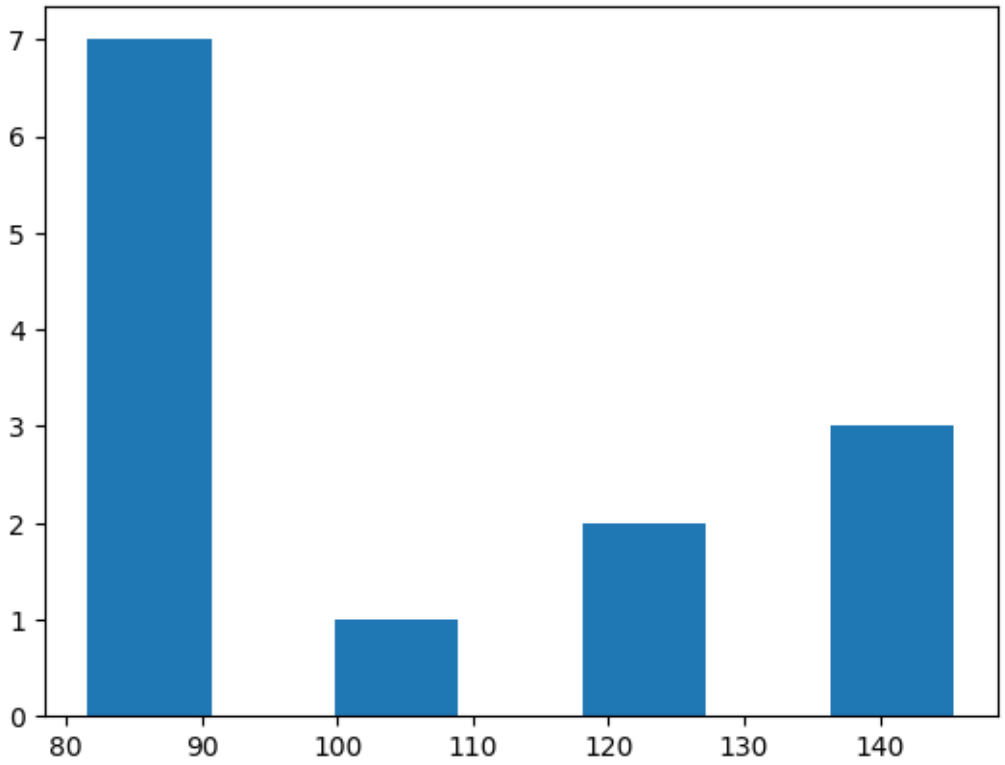
[15]:
```
blood_sugar = [113, 85, 90, 150, 149, 88, 93, 115, 135, 80, 77, 82, 129]
plt.hist(blood_sugar , rwidth=.95 ) # rwidth --> relative width
# bins --> set ranges box n ... default is n bins
```

[15]:
```
(array([3., 3., 1., 0., 1., 1., 0., 2., 0., 2.]),
 array([ 77. ,  84.3,  91.6,  98.9, 106.2, 113.5, 120.8, 128.1, 135.4,
        142.7, 150. ]),
 <BarContainer object of 10 artists>)
```



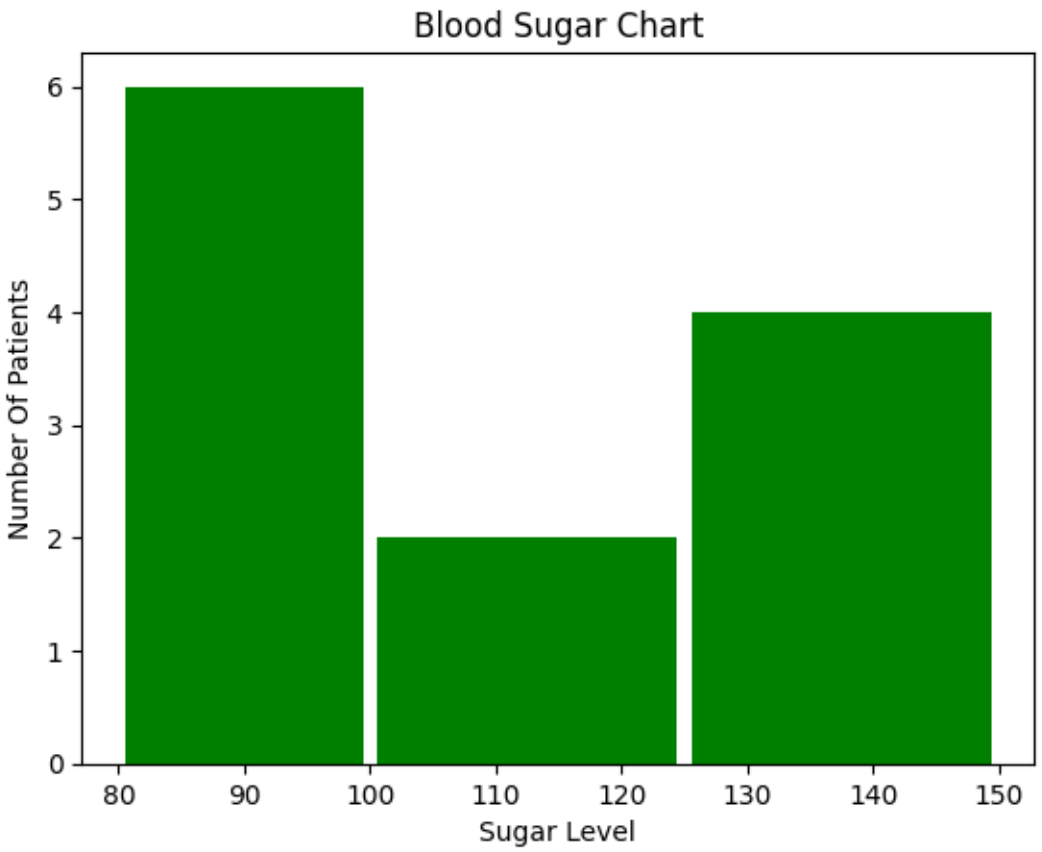
[16]:
```
# Bins
plt.hist(blood_sugar,rwidth=0.5,bins=4)
```

[16]:
```
(array([7., 1., 2., 3.]),
 array([ 77.  ,  95.25, 113.5 , 131.75, 150.  ]),
 <BarContainer object of 4 artists>)
```



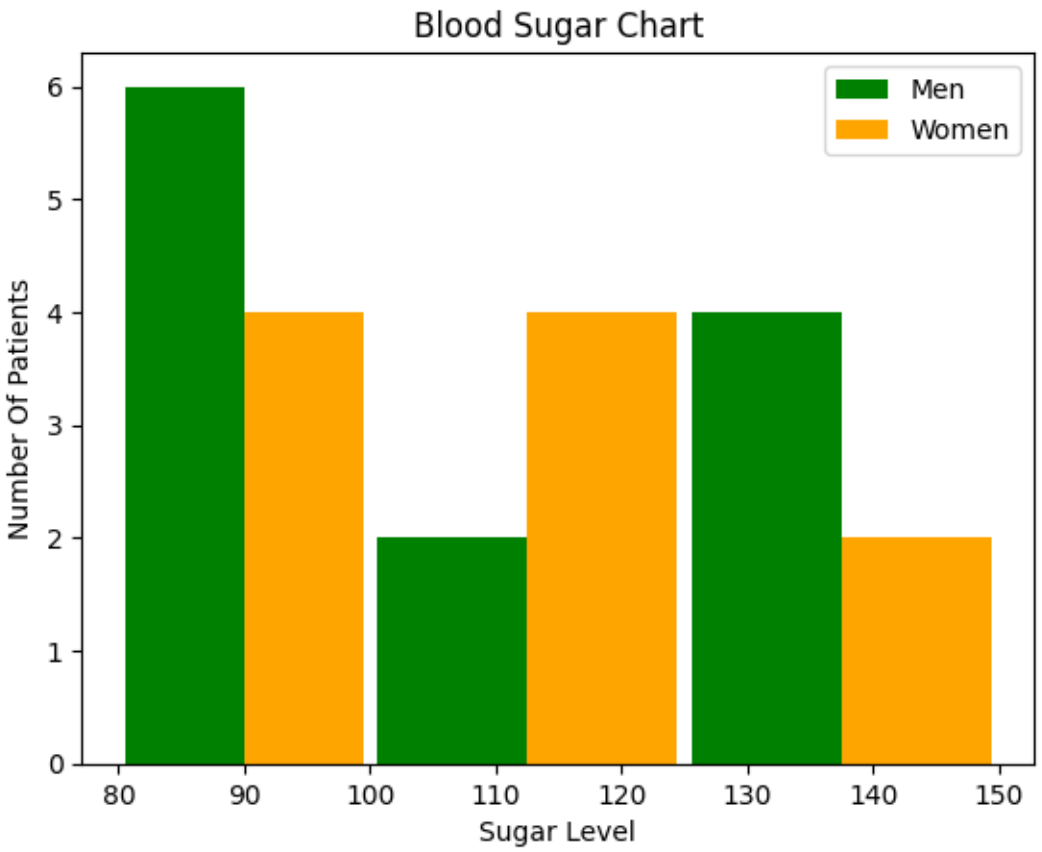
[17]:
```
# Custom bins:

plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")

plt.hist(blood_sugar, bins=[80,100,125,150], rwidth=0.95, color='g')
```

[17]:
```
(array([6., 2., 4.]),
 array([ 80., 100., 125., 150.]),
 <BarContainer object of 3 artists>)
```



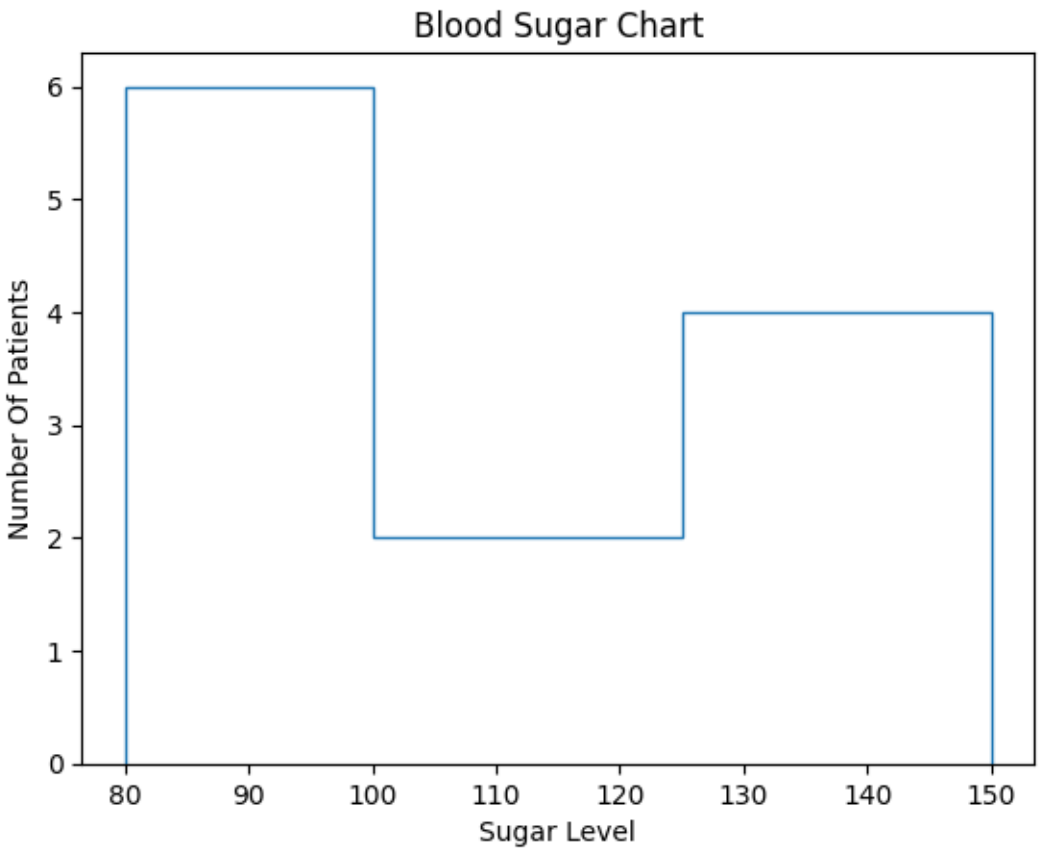
[18]:
```
# Side by side Histogram:

plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")

blood_sugar_men = [113, 85, 90, 150, 149, 88, 93, 115, 135, 80, 77, 82, 129]
blood_sugar_women = [67, 98, 89, 120, 133, 150, 84, 69, 89, 79, 120, 112, 100]

plt.hist([blood_sugar_men,blood_sugar_women], bins=[80,100,125,150], rwidth=0.
↪95, color=['green','orange'],label=['Men','Women'])
plt.legend()
```

[18]:
```
<matplotlib.legend.Legend at 0x7f269783e050>
```



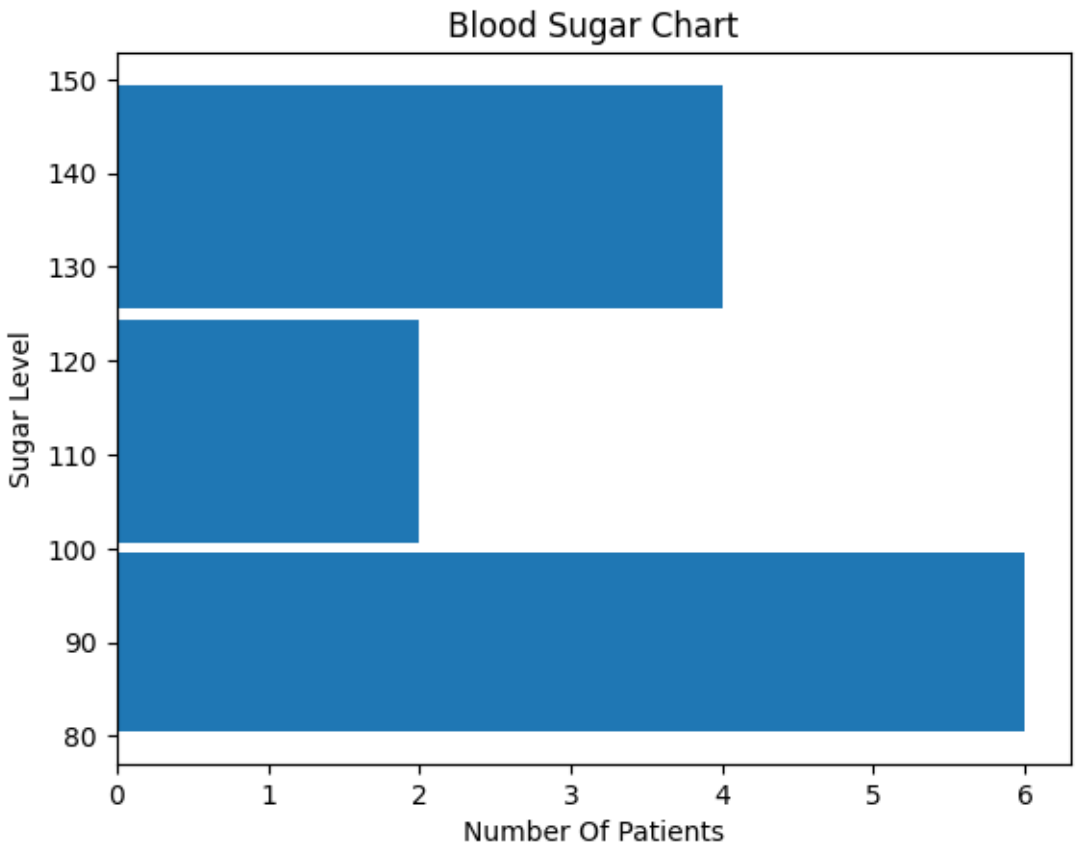
[19]:
```
# histtype=step
plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")

plt.hist(blood_sugar,bins=[80,100,125,150],rwidth=0.95,histtype='step')
```

[19]:
```
(array([6., 2., 4.]),
 array([ 80., 100., 125., 150.]),
 [<matplotlib.patches.Polygon at 0x7f26978f3130>])
```



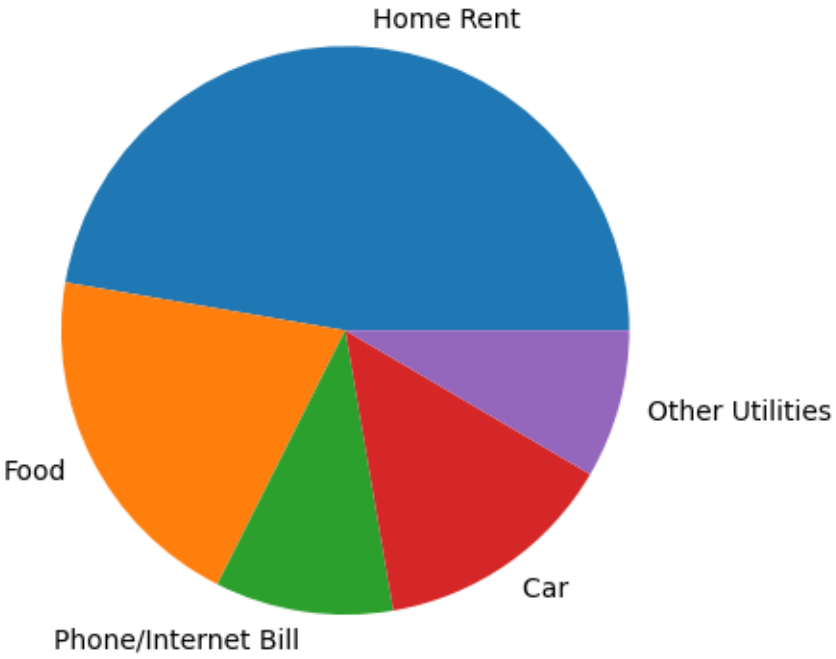
[20]:
```
# horizontal orientation:
plt.xlabel("Number Of Patients")
plt.ylabel("Sugar Level")
plt.title("Blood Sugar Chart")

plt.hist(blood_sugar, bins=[80,100,125,150], rwidth=0.95,␣
 ↪orientation='horizontal')
```

[20]:
```
(array([6., 2., 4.]),
 array([ 80., 100., 125., 150.]),
 <BarContainer object of 3 artists>)
```

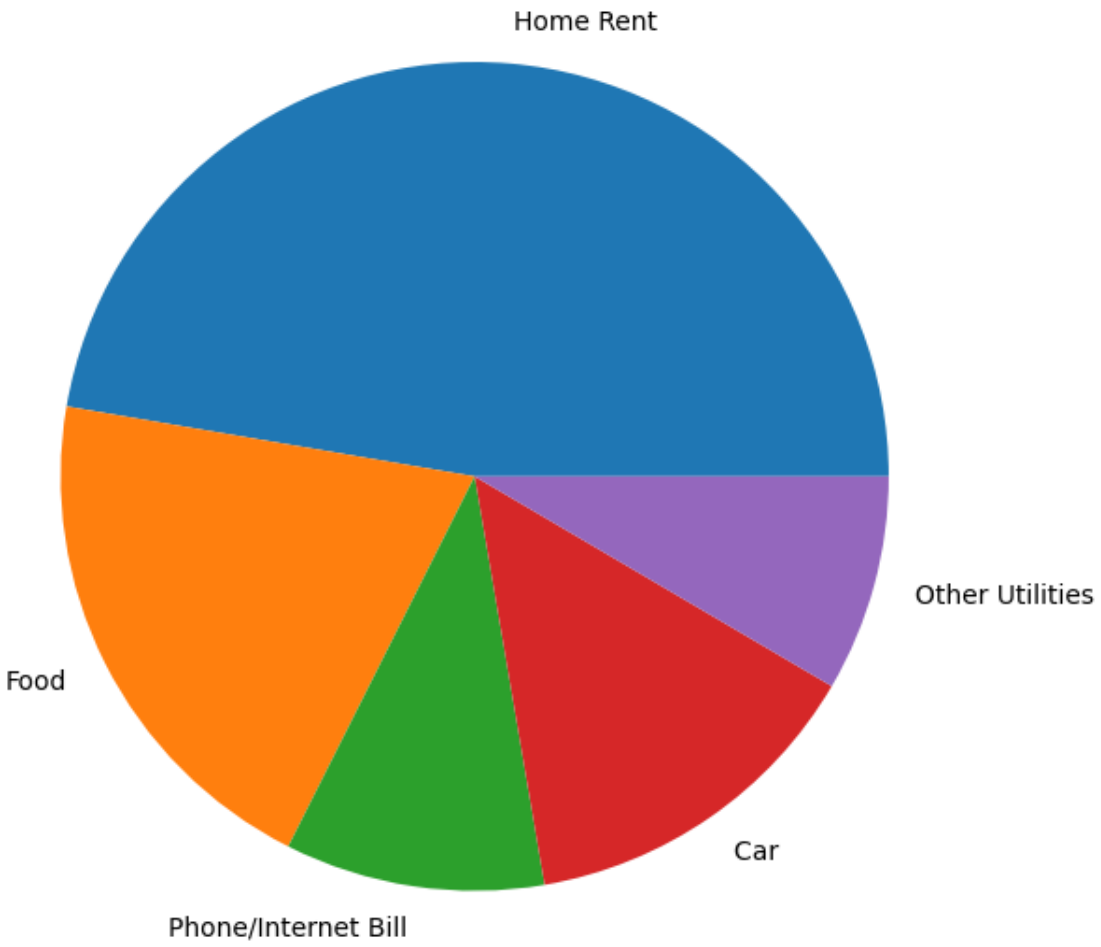


1.9 Pie Chart

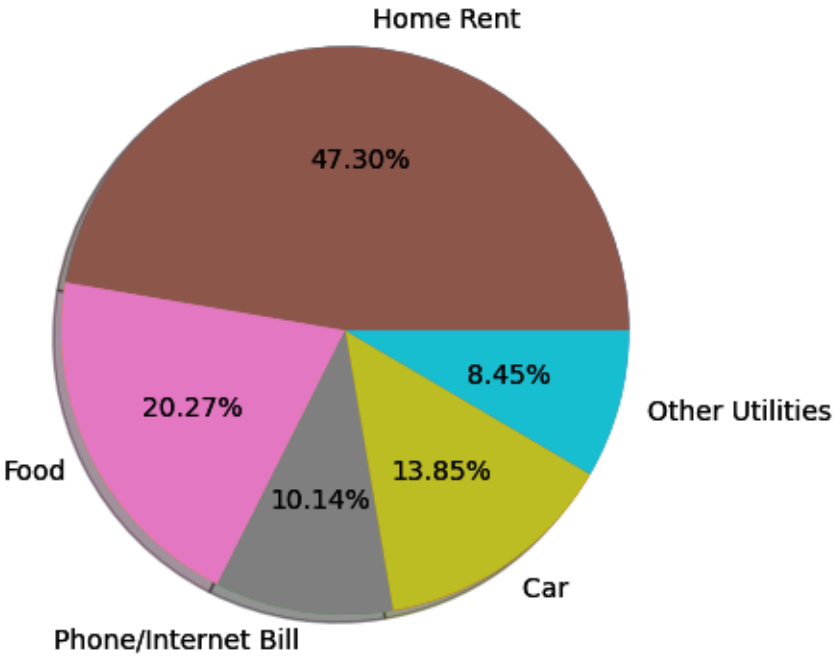
[21]:
```
exp_vals = [1400,600,300,410,250]
exp_labels = ["Home Rent","Food","Phone/Internet Bill","Car ","Other Utilities"]
plt.pie(exp_vals,labels=exp_labels)
plt.show()
```



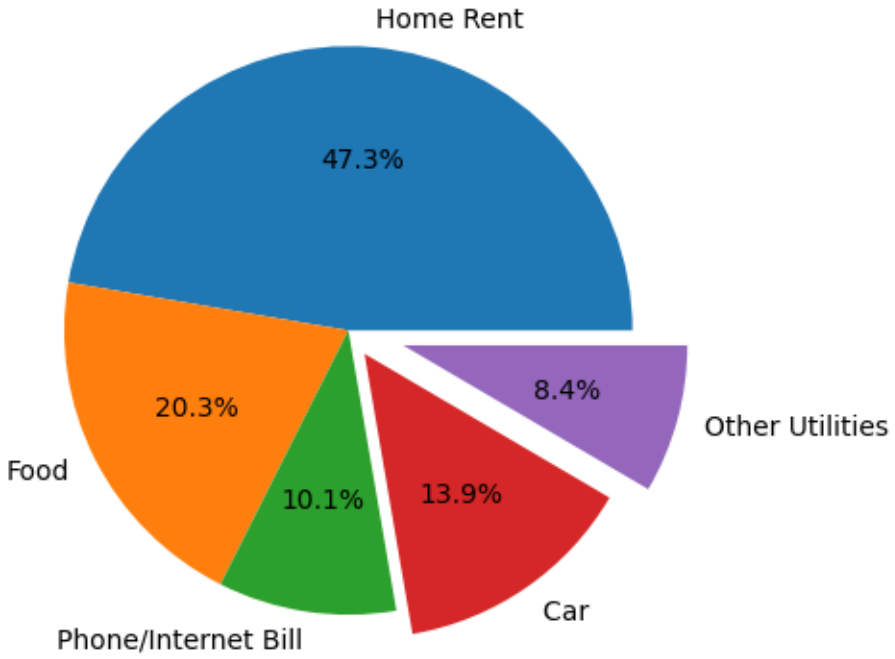
[22]:
```
# Change Redious:
plt.pie(exp_vals,labels=exp_labels , radius=1.5) # Default value is 1
plt.show()
```



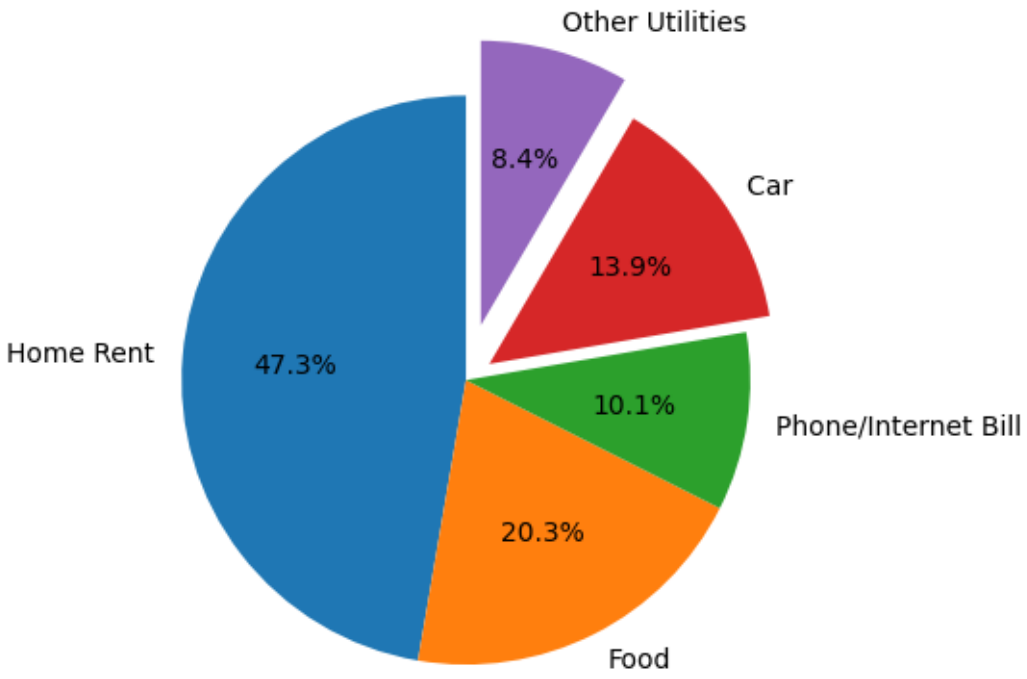
[23]:
```
# Show percentage ( % ):
plt.pie(exp_vals,labels=exp_labels , autopct = "%0.2f%%" )# 0.2 --> after point␣
↪digits

# Shadow :
plt.pie(exp_vals,labels=exp_labels , autopct = "%0.2f%%" , shadow=True)
plt.show()
```



[24]:
```
# Explode:
plt.pie(exp_vals,labels=exp_labels, autopct='%1.1f%%',explode=[0,0,0,0.1,0.2])
plt.show()
```

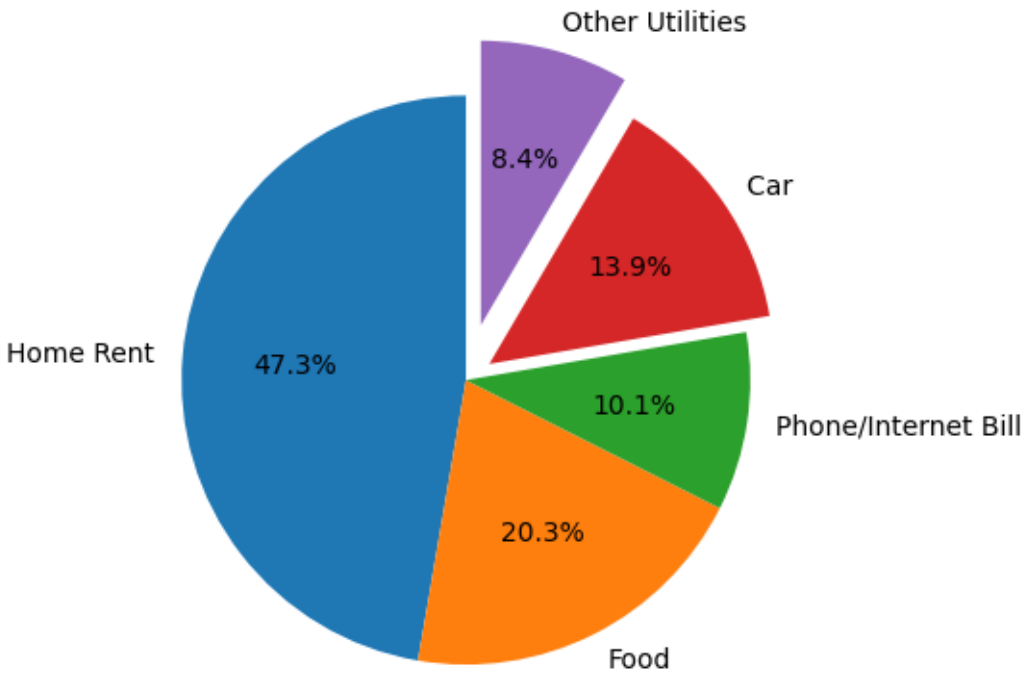


[25]:
```
# Rotate:
plt.pie(exp_vals,labels=exp_labels, autopct='%1.1f%%',explode=[0,0,0,0.1,0.2] ,␣
 ↪startangle = 90)
plt.show()    # rotate 90 digres
```



1.10 Save Chart

[26]:
```
plt.pie(exp_vals,labels=exp_labels, autopct='%1.1f%%',explode=[0,0,0,0.1,0.2] ,␣
↪startangle = 90)
plt.savefig("pie.png")
# Some Argument:
# bbox_inchies , pad_inchies , transparent etc..
```


Other Utilities
8.4%
Car
13.9%
Home Rent
47.3%
10.1%
Phone/Internet Bill
20.3%
Food