matplotlib

May 8, 2024

Matplotlib

Matplotlib is a popular plotting library in Python used for creating high-quality visualizations and graphs. It offers various tools to generate diverse plots, facilitating data analysis, exploration, and presentation.

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

[ ]:
```
roll = np.array([1,2,3,4,5])
marks = np.array([87,75,50,67,98])
```

[ ]:
```
roll
```

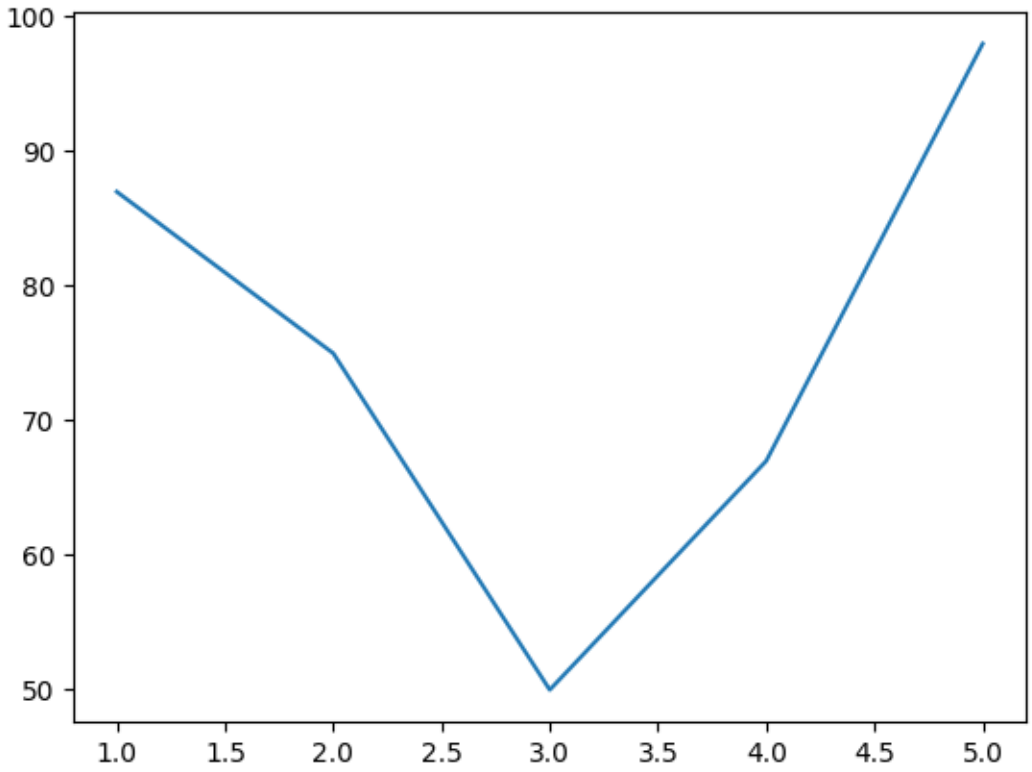
[ ]:
```
array([1, 2, 3, 4, 5])
```

[ ]:
```
marks
```

[ ]:
```
array([87, 75, 50, 67, 98])
```

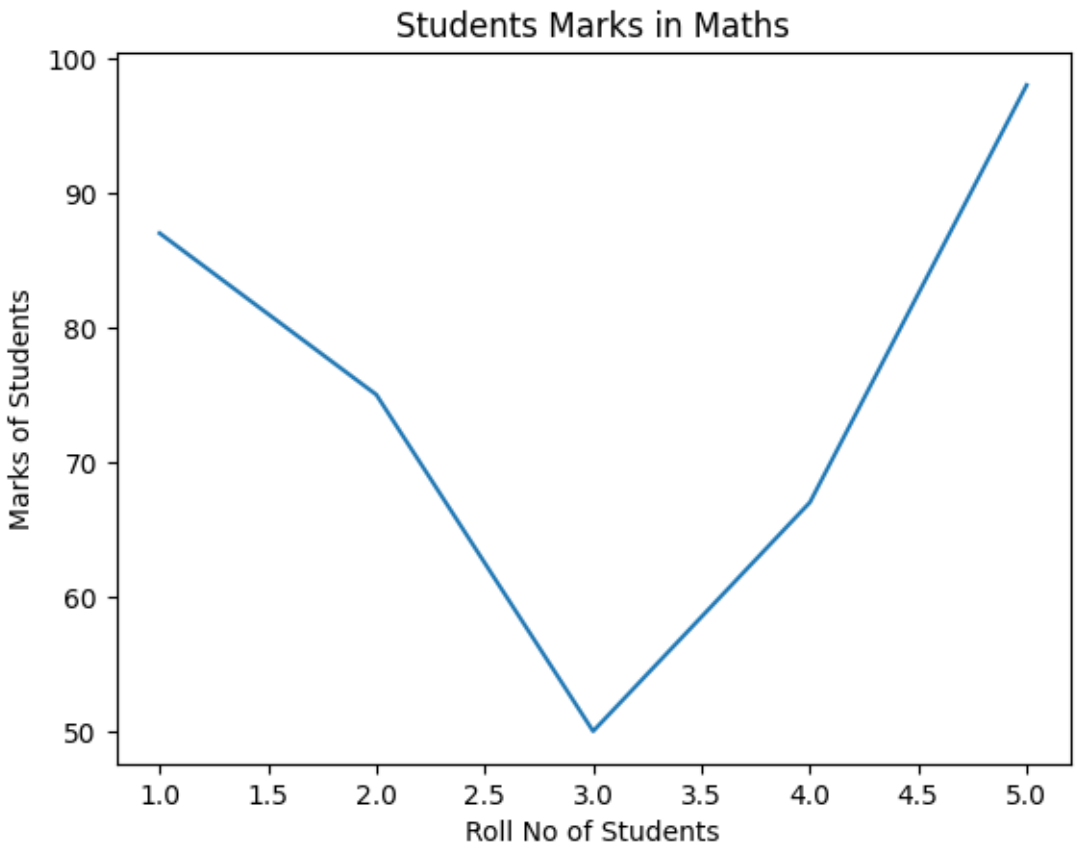
[ ]:
```
plt.plot(roll, marks)
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e201e0460>]
```



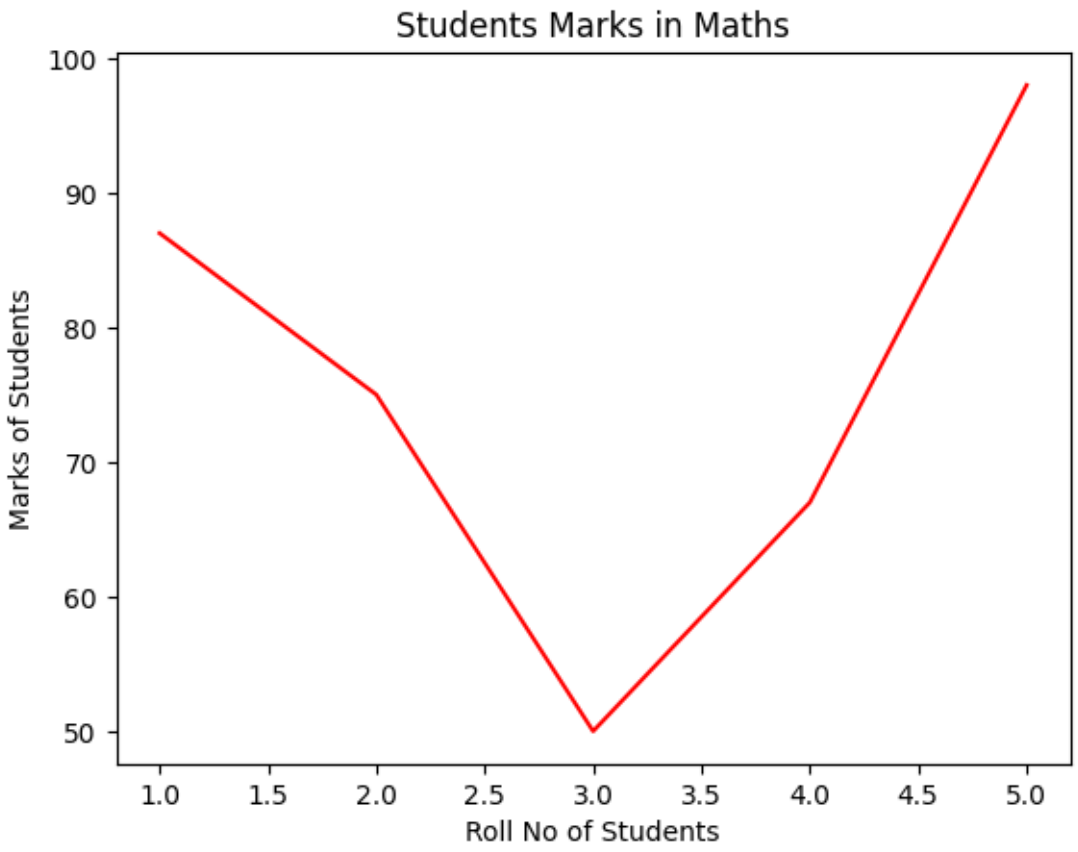
[ ]:
```
plt.xlabel("Roll No of Students")
plt.ylabel("Marks of Students")
plt.title("Students Marks in Maths")
plt.plot(roll, marks)
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0bf65c90>]
```



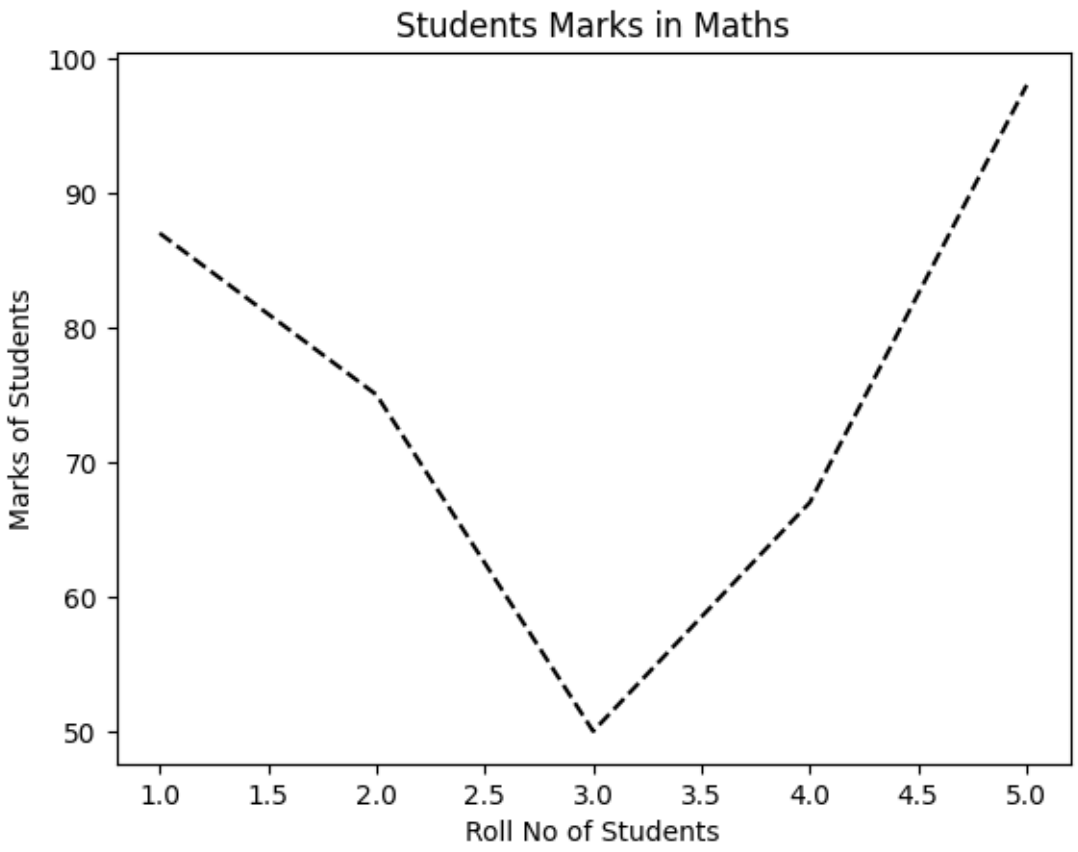
[ ]:
```
plt.xlabel("Roll No of Students")
plt.ylabel("Marks of Students")
plt.title("Students Marks in Maths")
plt.plot(roll, marks, color = 'red')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b6a0190>]
```



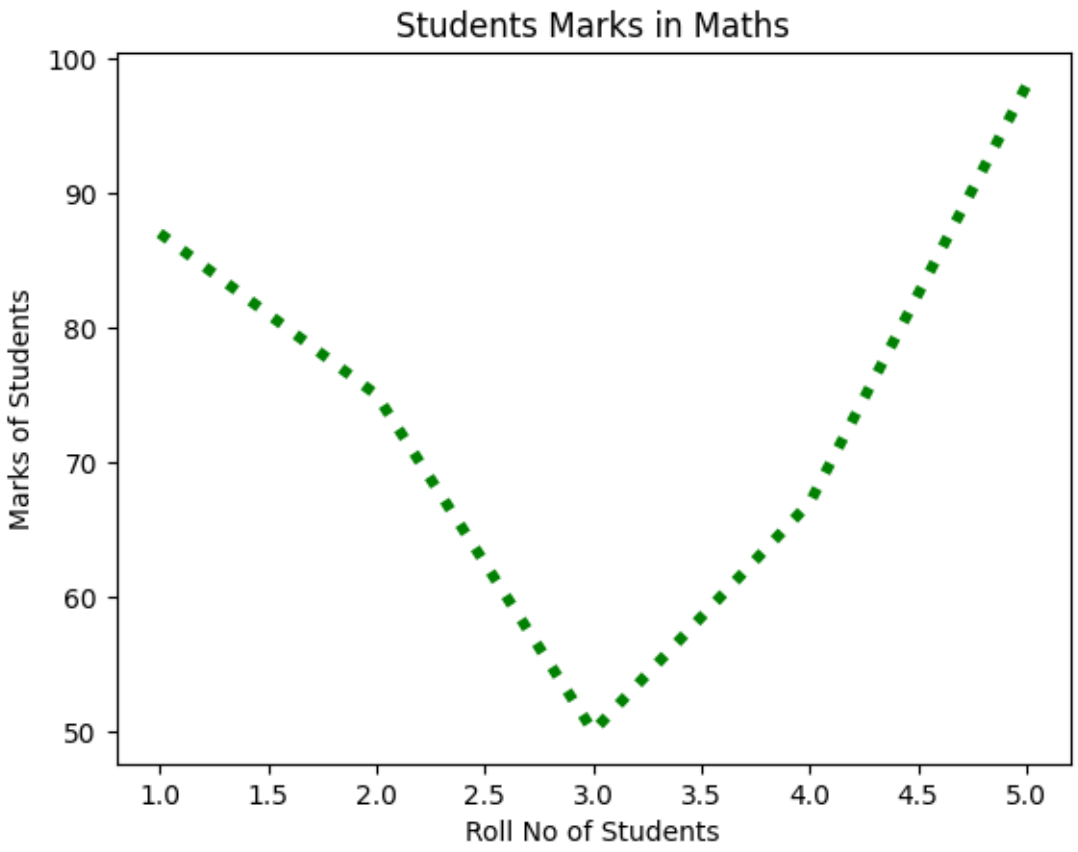
[ ]:
```
plt.xlabel("Roll No of Students")
plt.ylabel("Marks of Students")
plt.title("Students Marks in Maths")
plt.plot(roll, marks, color='black', linestyle='dashed')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b48b5e0>]
```



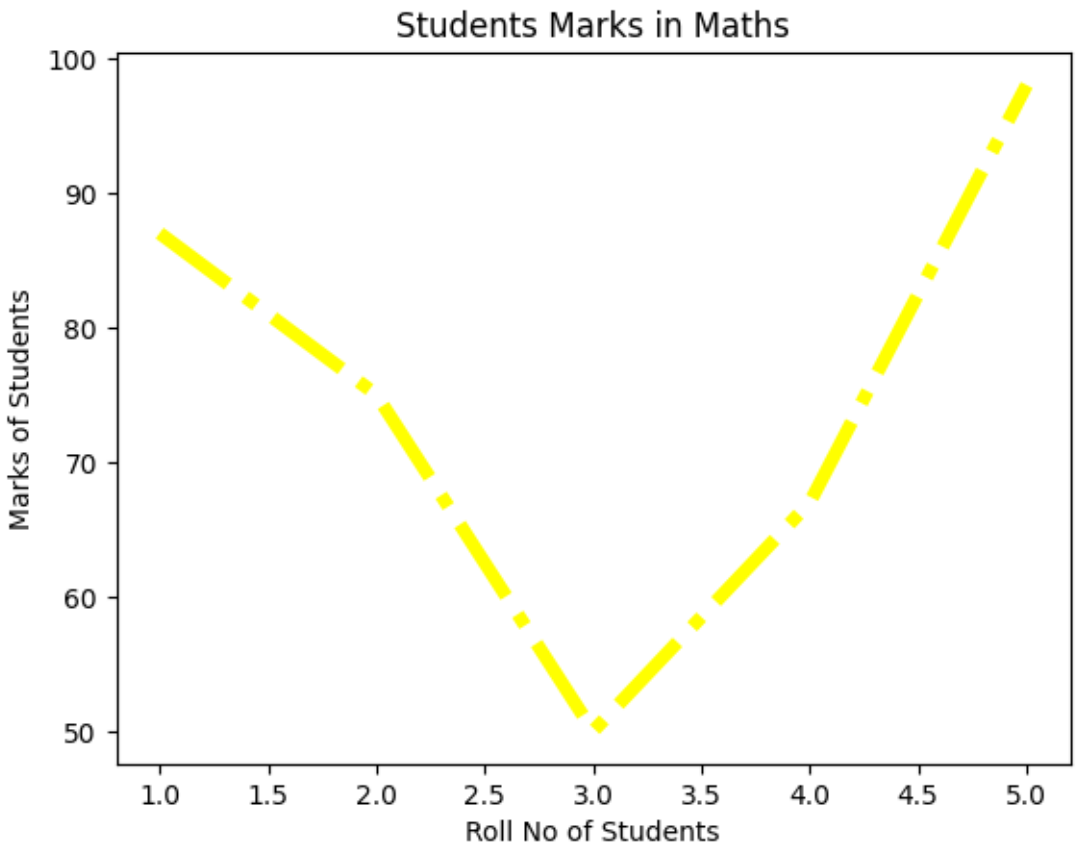
[ ]:
```
plt.xlabel("Roll No of Students")
plt.ylabel("Marks of Students")
plt.title("Students Marks in Maths")
plt.plot(roll, marks, color='green', linewidth = 4, linestyle='dotted')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b543940>]
```



[ ]:
```
plt.xlabel("Roll No of Students")
plt.ylabel("Marks of Students")
plt.title("Students Marks in Maths")
plt.plot(roll, marks, color='yellow', linewidth = 5, linestyle='dashdot')
```

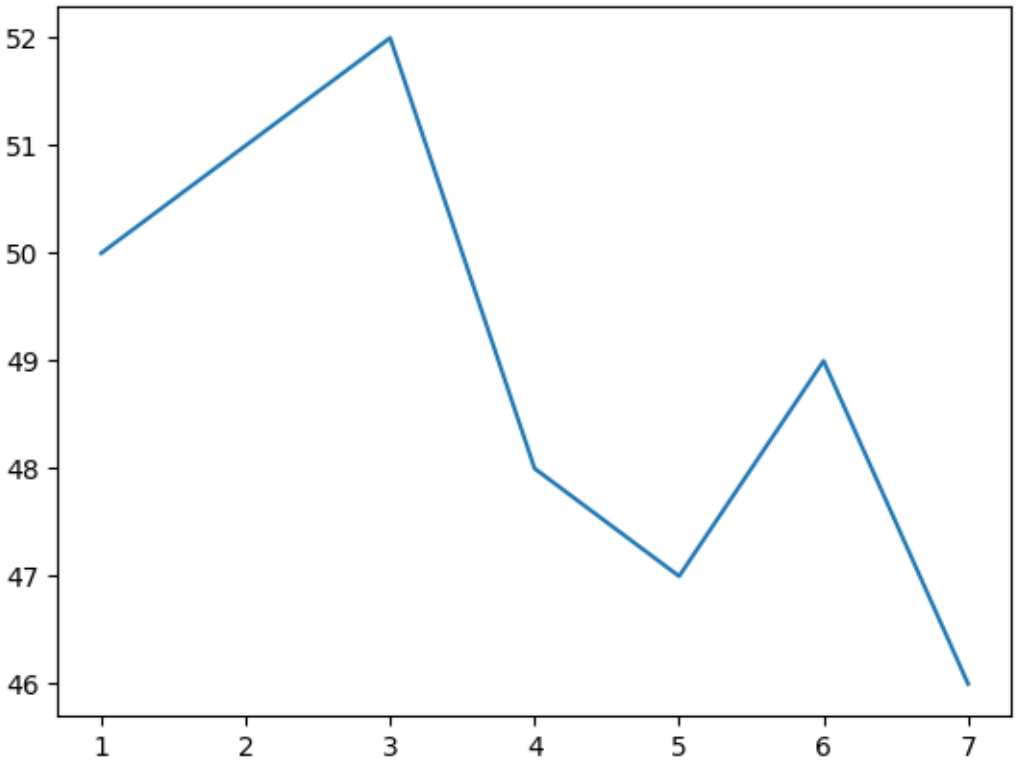
[ ]:
```
[<matplotlib.lines.Line2D at 0x788e093073d0>]
```



[ ]:
```
x=[1,2,3,4,5,6,7]
y=[50,51,52,48,47,49,46]
```

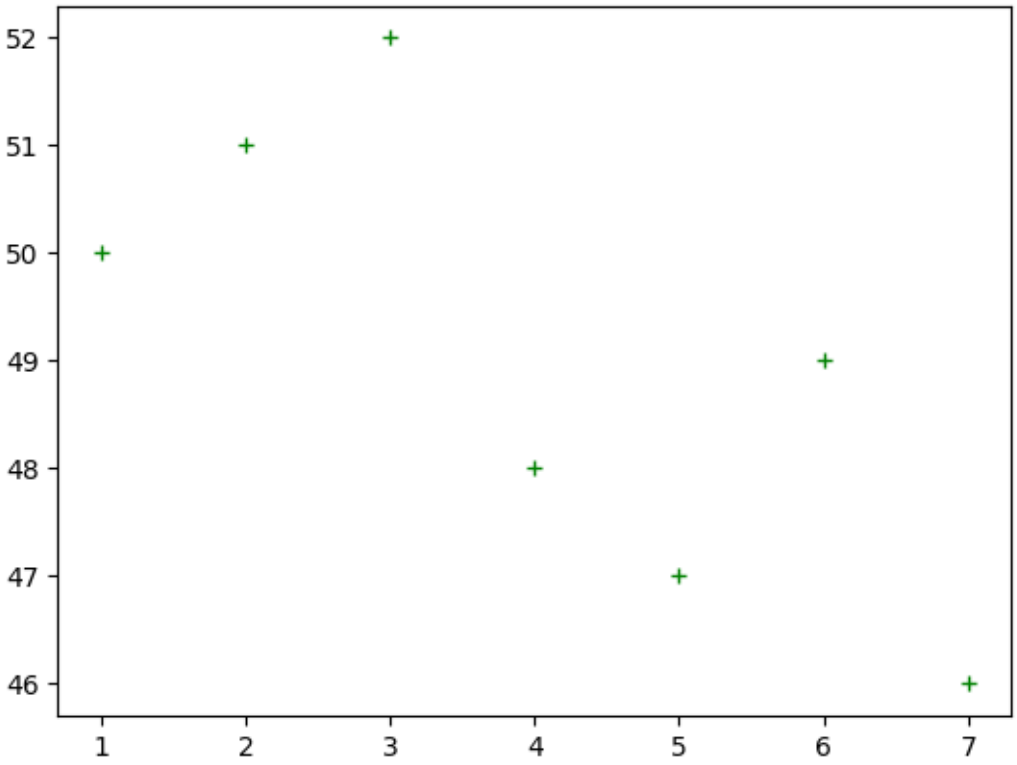
[ ]:
```
plt.plot(x,y)
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b5b4160>]
```



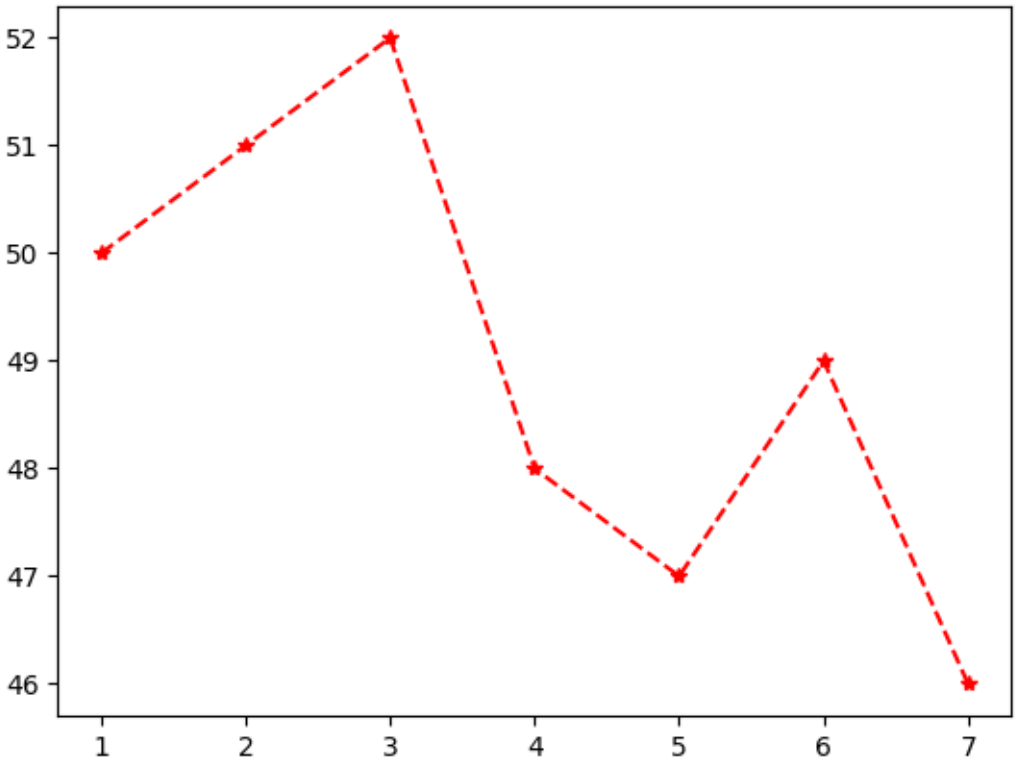
[ ]:
```
plt.plot(x,y,'g+')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b4c25c0>]
```



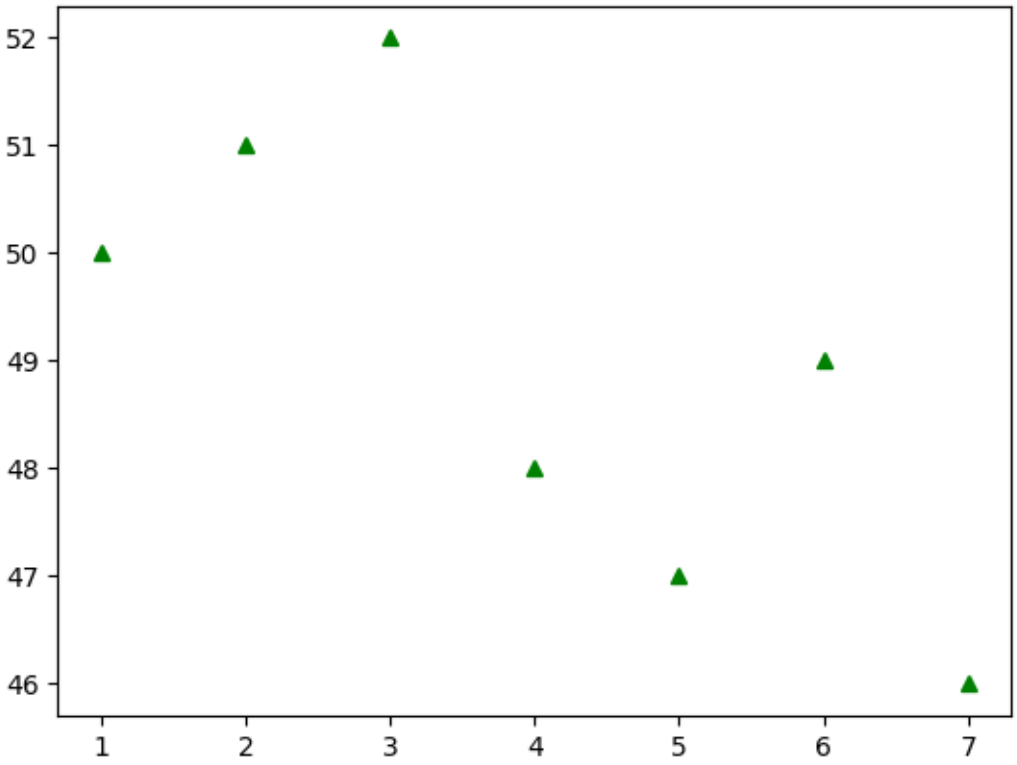
[ ]:
```
plt.plot(x,y,'r*--')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0b4c1180>]
```



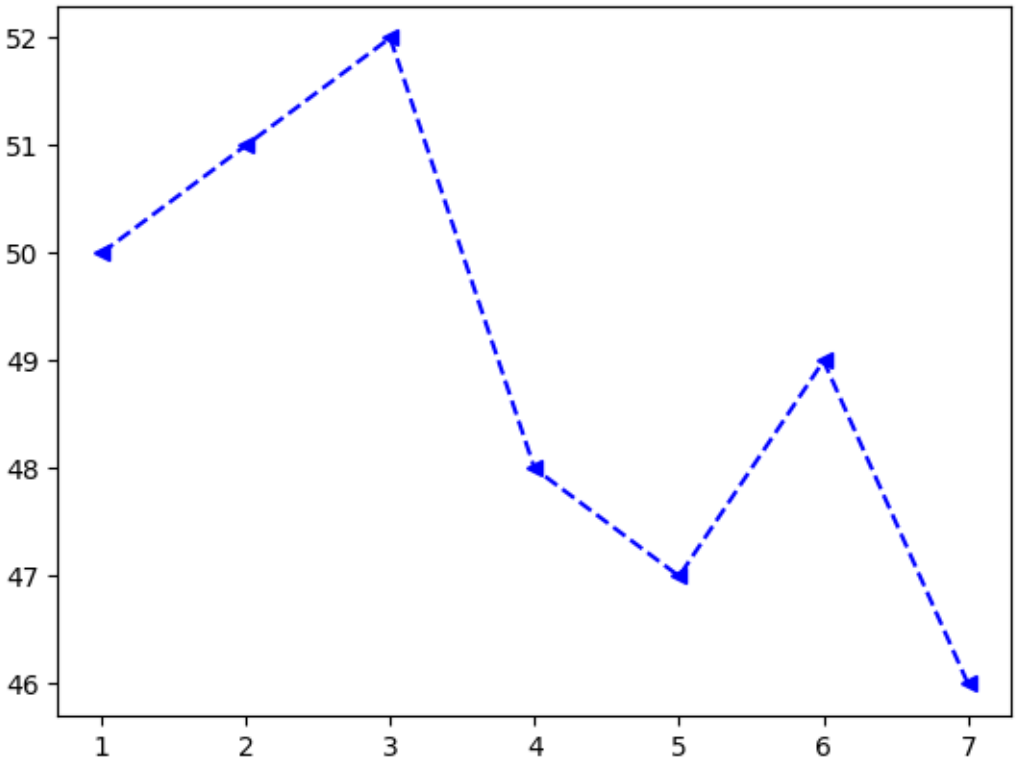
[ ]:
```
plt.plot(x,y,'g^')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e090a9810>]
```



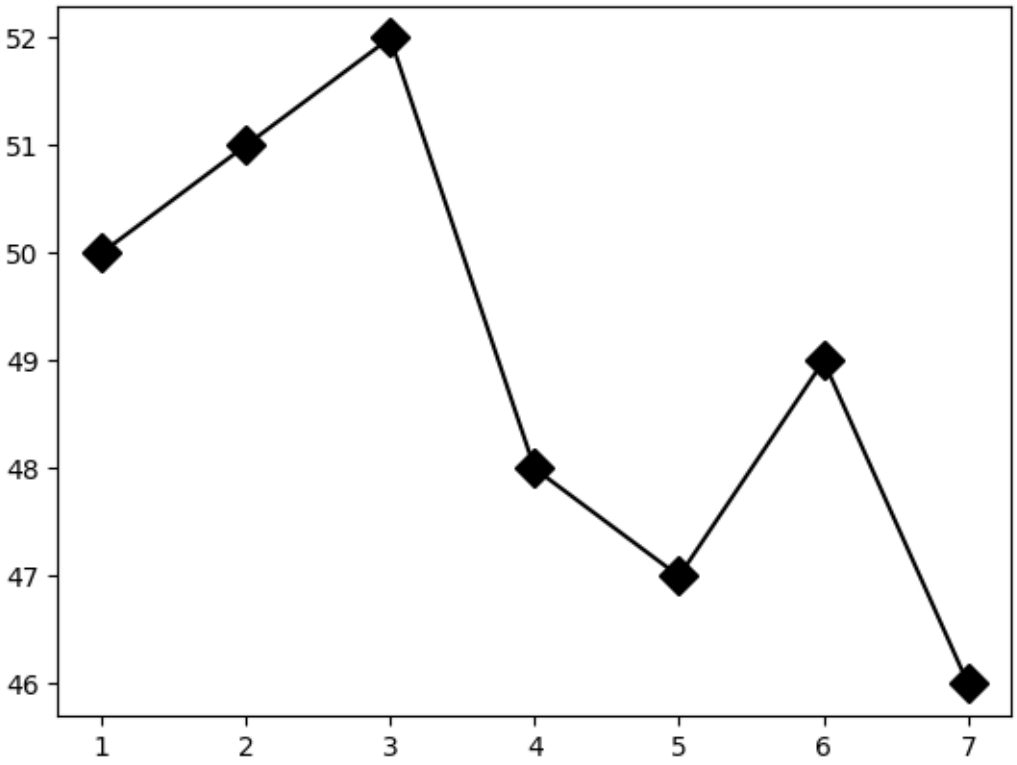
[ ]:
```
plt.plot(x,y,'b<--')
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e08fac2e0>]
```



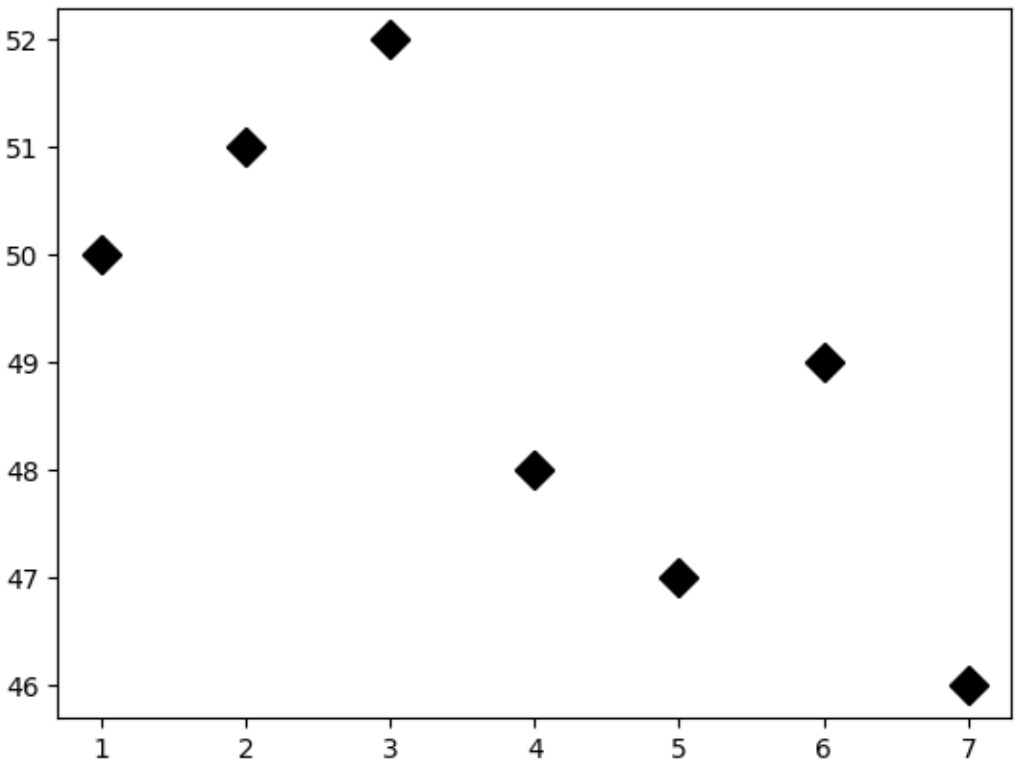
[ ]:
```
plt.plot(x,y,color='black', marker='D', markersize = 10)
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e090ee950>]
```



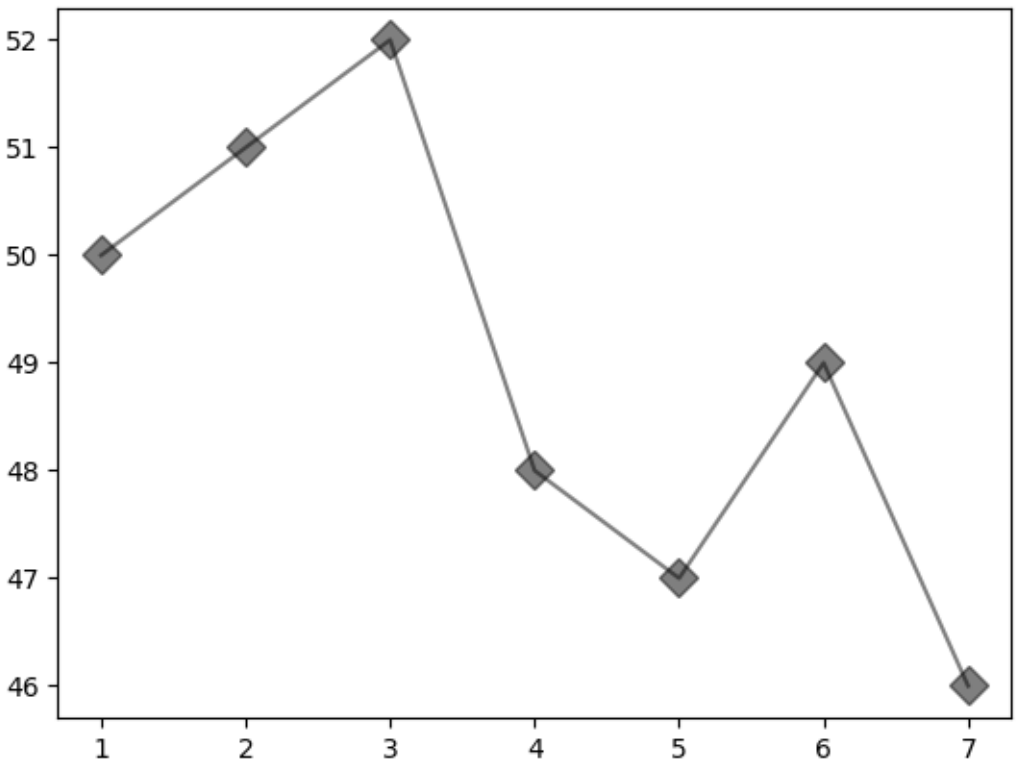
[ ]:
```
plt.plot(x,y,color='black', marker='D', linestyle='', markersize = 10)
```

[ ]:
```
[<matplotlib.lines.Line2D at 0x788e08e91420>]
```



[ ]:
```
plt.plot(x,y,color='black', marker='D', markersize = 10, alpha=0.5)
```

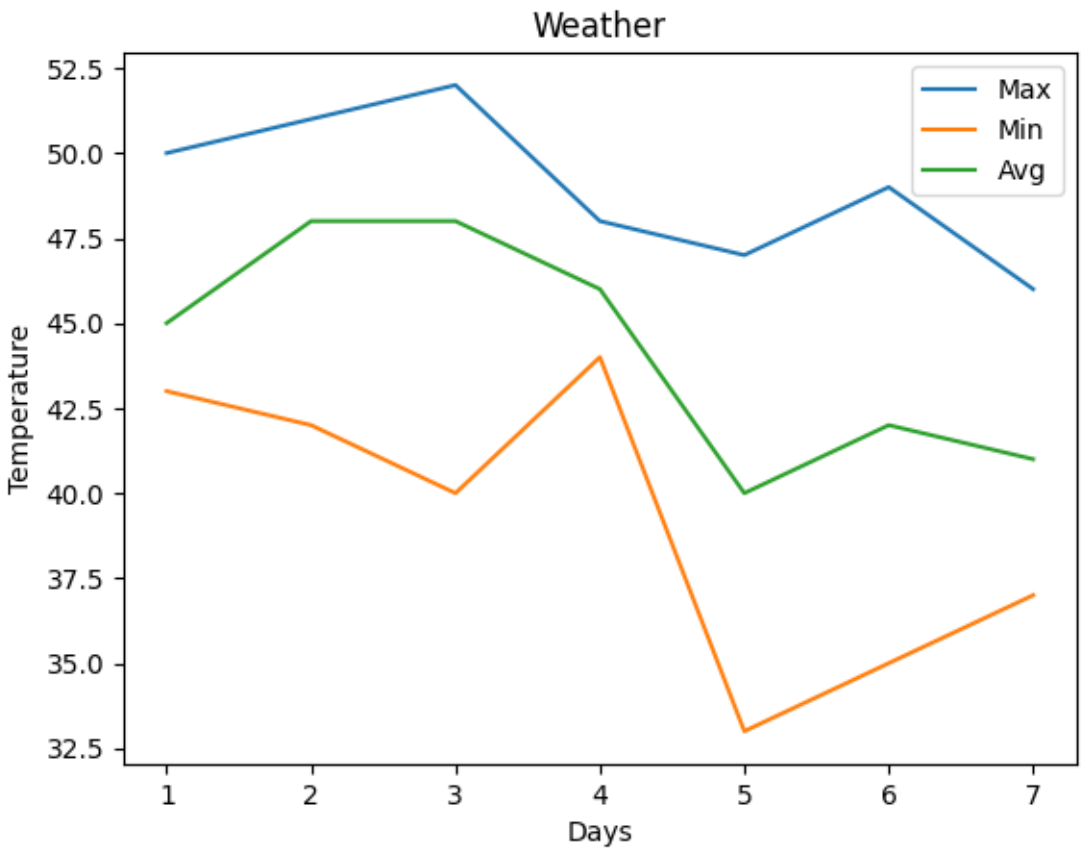
[ ]:
```
[<matplotlib.lines.Line2D at 0x788e0902ffa0>]
```



[ ]:
```
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]
```

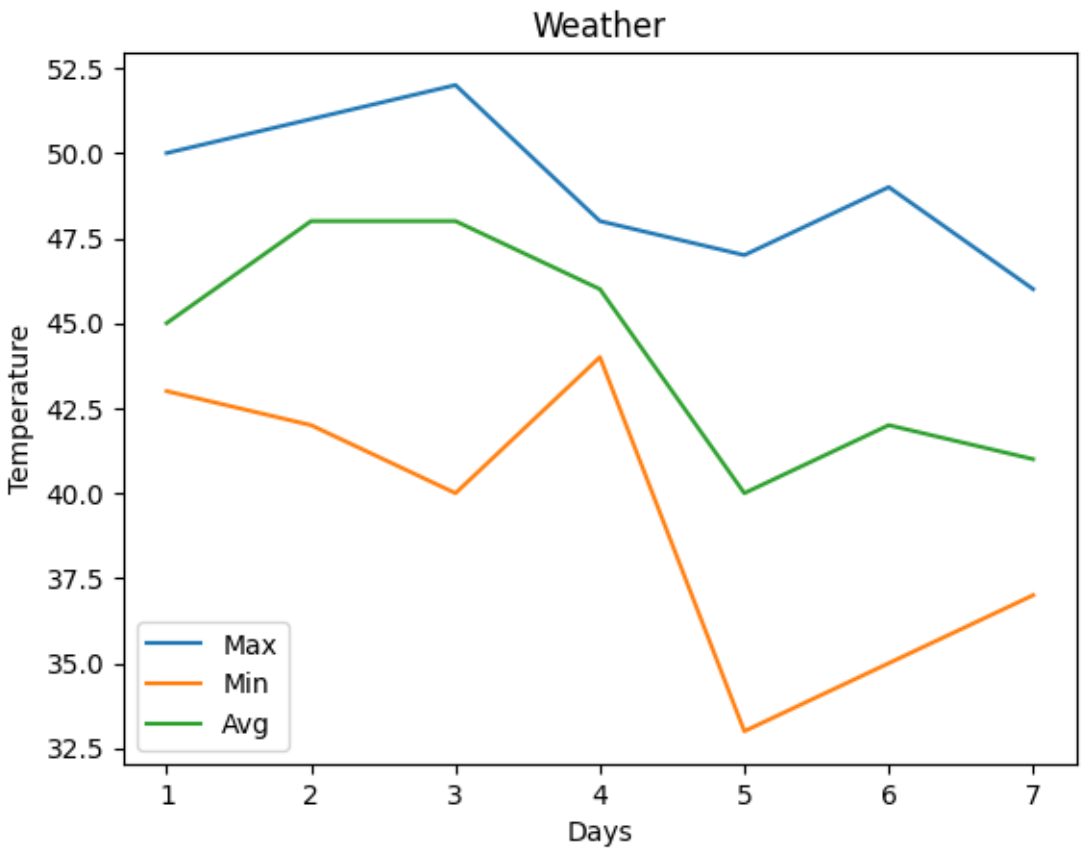
[ ]:
```
plt.xlabel('Days')
plt.ylabel('Temperature')
plt.title("Weather")
plt.plot(days, max_t, label="Max")
plt.plot(days, min_t, label="Min")
plt.plot(days, avg_t, label="Avg")
plt.legend()
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08b8d2d0>
```



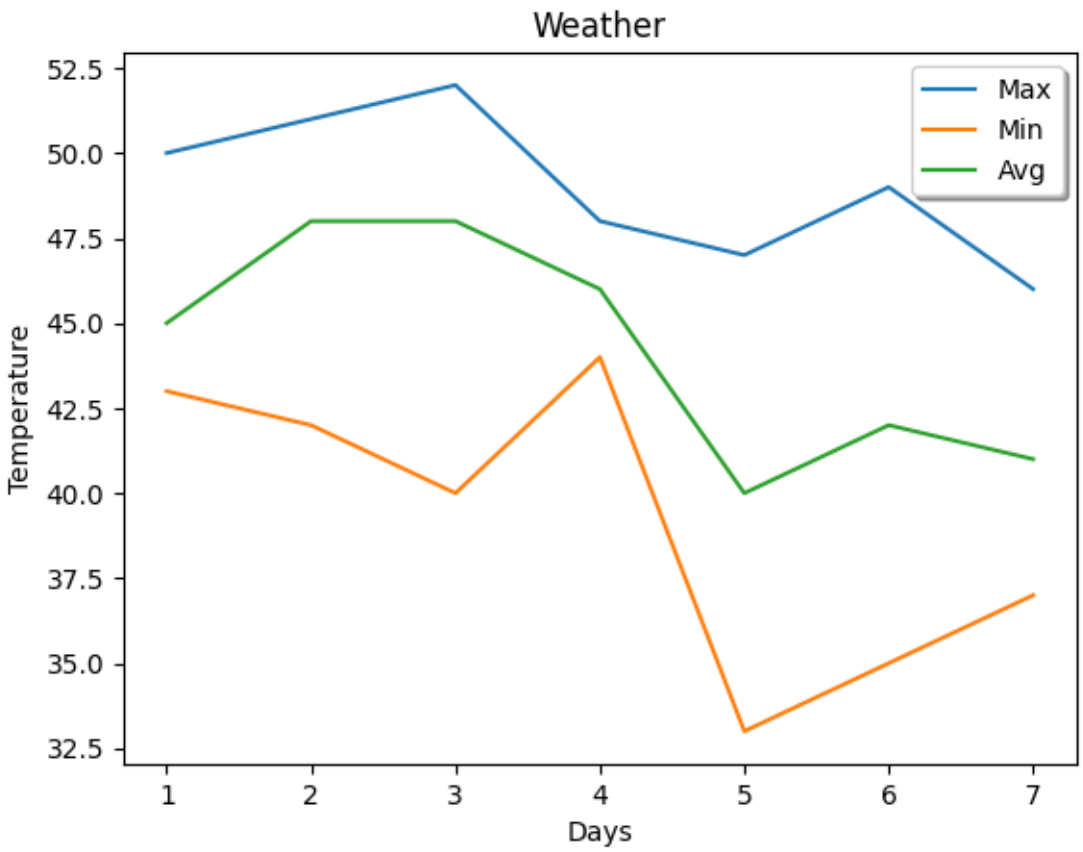
[ ]:
```
plt.xlabel('Days')
plt.ylabel('Temperature')
plt.title("Weather")
plt.plot(days, max_t, label="Max")
plt.plot(days, min_t, label="Min")
plt.plot(days, avg_t, label="Avg")
plt.legend(loc='lower left')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08a4f970>
```



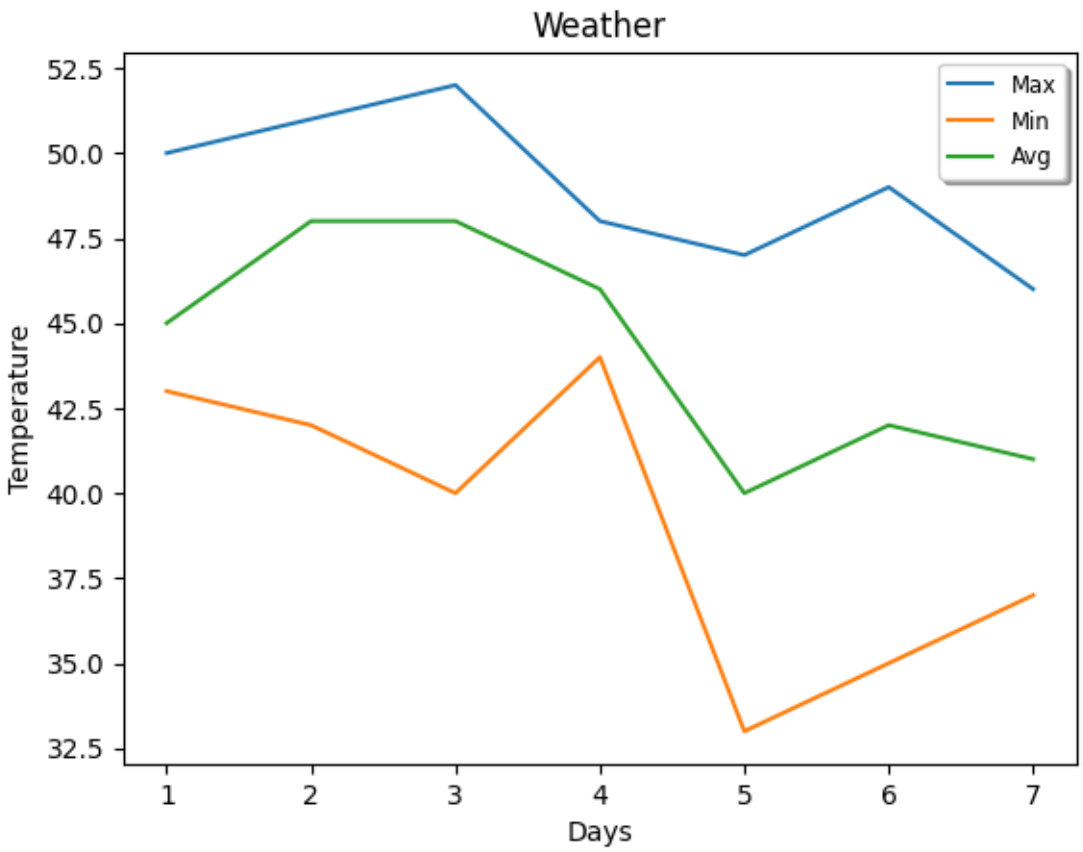
[ ]:
```
plt.xlabel('Days')
plt.ylabel('Temperature')
plt.title("Weather")
plt.plot(days, max_t, label="Max")
plt.plot(days, min_t, label="Min")
plt.plot(days, avg_t, label="Avg")
plt.legend(loc='best', shadow = True)
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08c0e230>
```

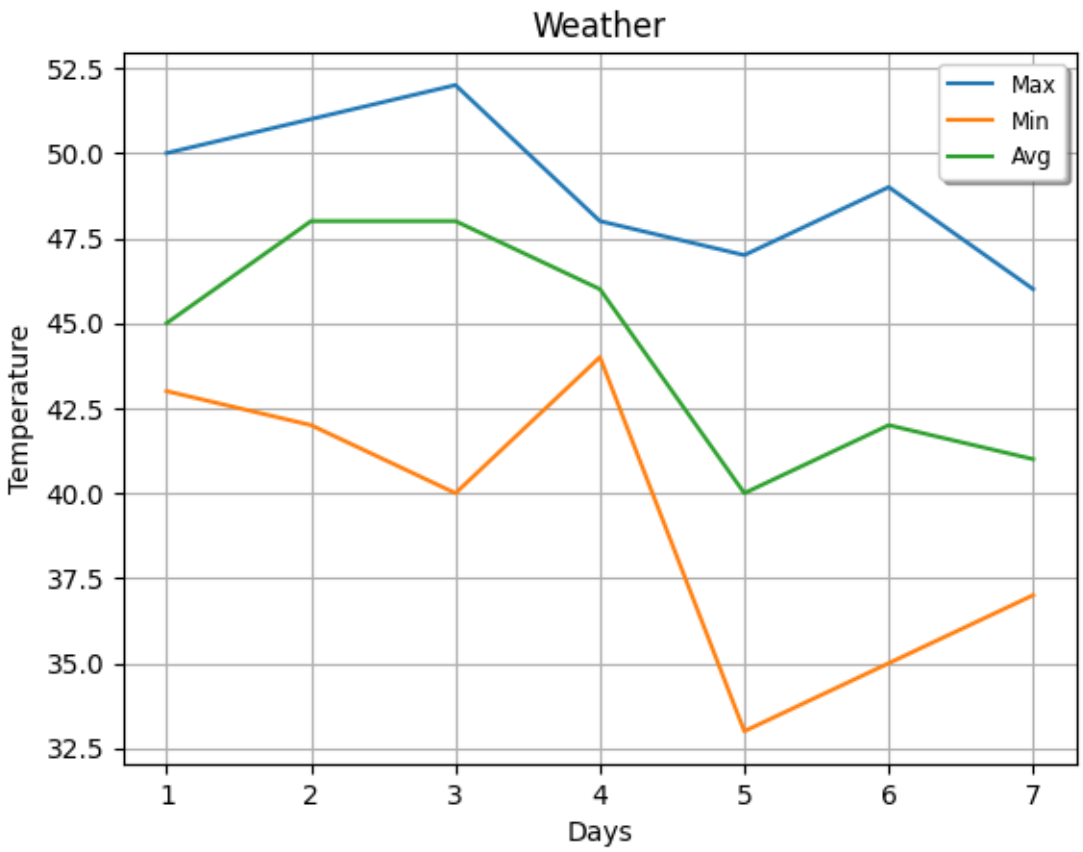


[ ]:
```
plt.xlabel('Days')
plt.ylabel('Temperature')
plt.title("Weather")
plt.plot(days, max_t, label="Max")
plt.plot(days, min_t, label="Min")
plt.plot(days, avg_t, label="Avg")
plt.legend(loc='best', shadow = True, fontsize = 'small')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08bb4640>
```



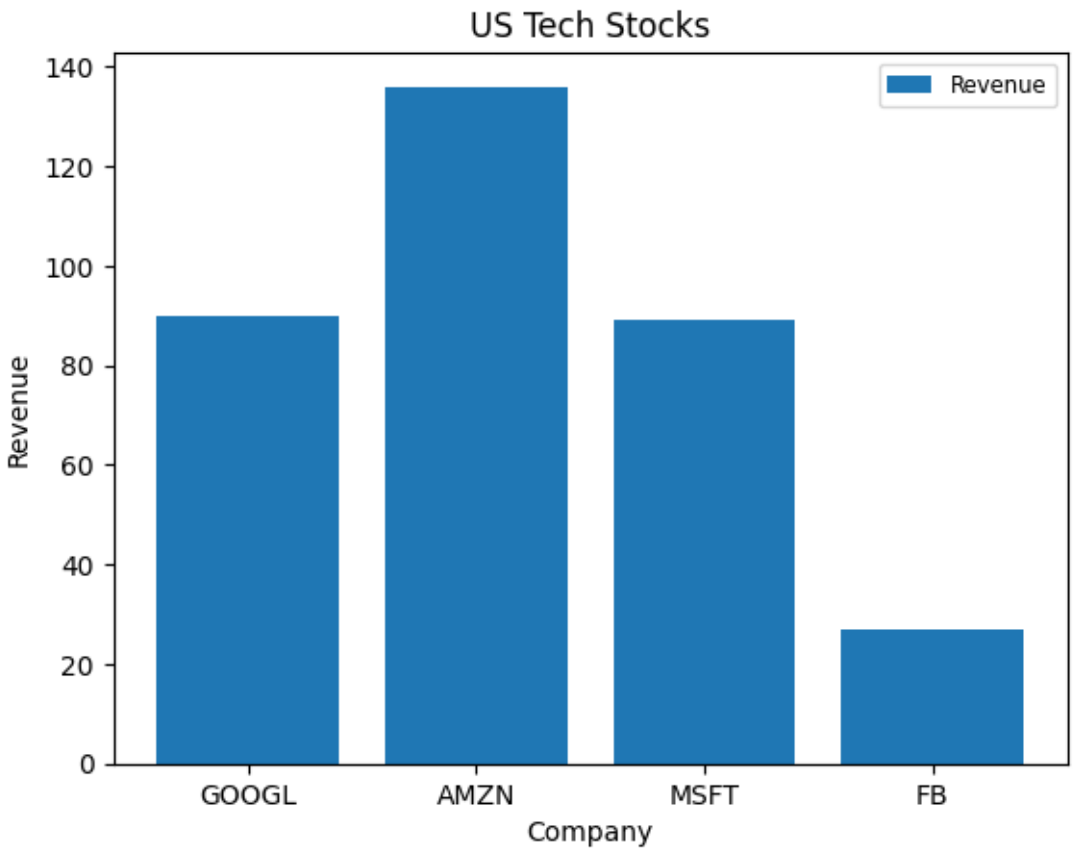
[ ]:
```
plt.xlabel('Days')
plt.ylabel('Temperature')
plt.title("Weather")
plt.plot(days, max_t, label="Max")
plt.plot(days, min_t, label="Min")
plt.plot(days, avg_t, label="Avg")
plt.legend(loc='best', shadow = True, fontsize = 'small')
plt.grid()
```



[ ]:
```
company=['GOOGL','AMZN','MSFT','FB']
revenue=[90,136,89,27]
```

[ ]:
```
plt.xlabel('Company')
plt.ylabel('Revenue')
plt.title('US Tech Stocks')
plt.bar(company, revenue, label='Revenue')
plt.legend(fontsize='small', loc='best')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e0878a350>
```

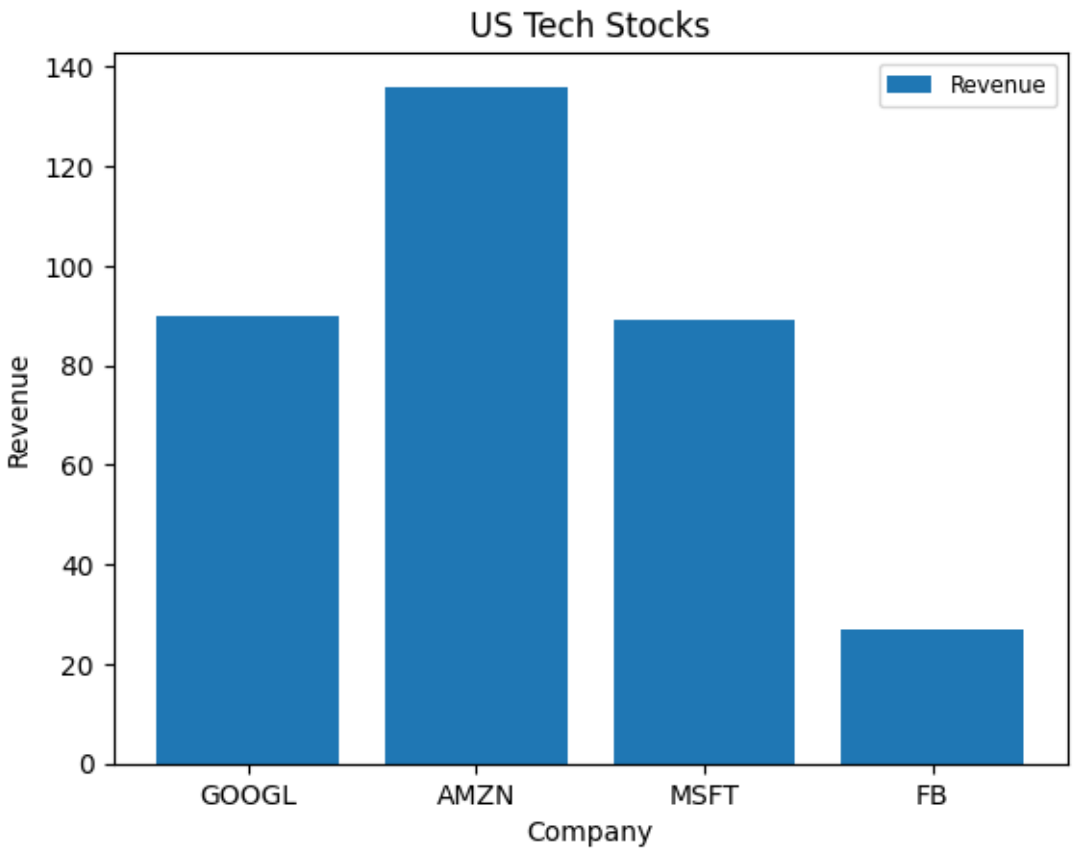


[ ]:
```
y = np.arange(len(company))
y
```

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

[ ]:
```
plt.xticks(y, company)
plt.xlabel('Company')
plt.ylabel('Revenue')
plt.title('US Tech Stocks')
plt.bar(y, revenue, label='Revenue')
plt.legend(fontsize='small', loc='best')
```

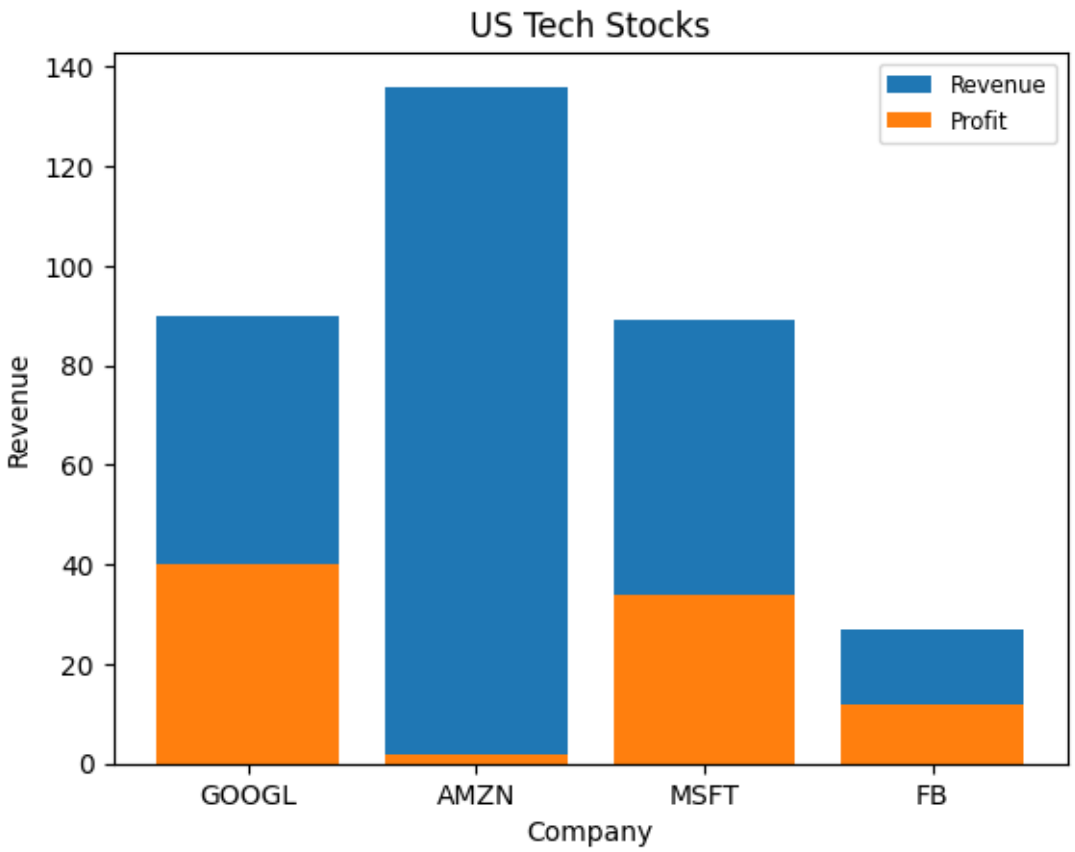
[ ]:
```
<matplotlib.legend.Legend at 0x788e08cbf6d0>
```



[ ]:
```
profit=[40,2,34,12]
```

[ ]:
```
plt.xticks(y, company)
plt.xlabel('Company')
plt.ylabel('Revenue')
plt.title('US Tech Stocks')
plt.bar(y, revenue, label='Revenue')
plt.bar(y,profit, label='Profit')
plt.legend(fontsize='small', loc='best')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08323e80>
```



[ ]:
```
y-0.2
```

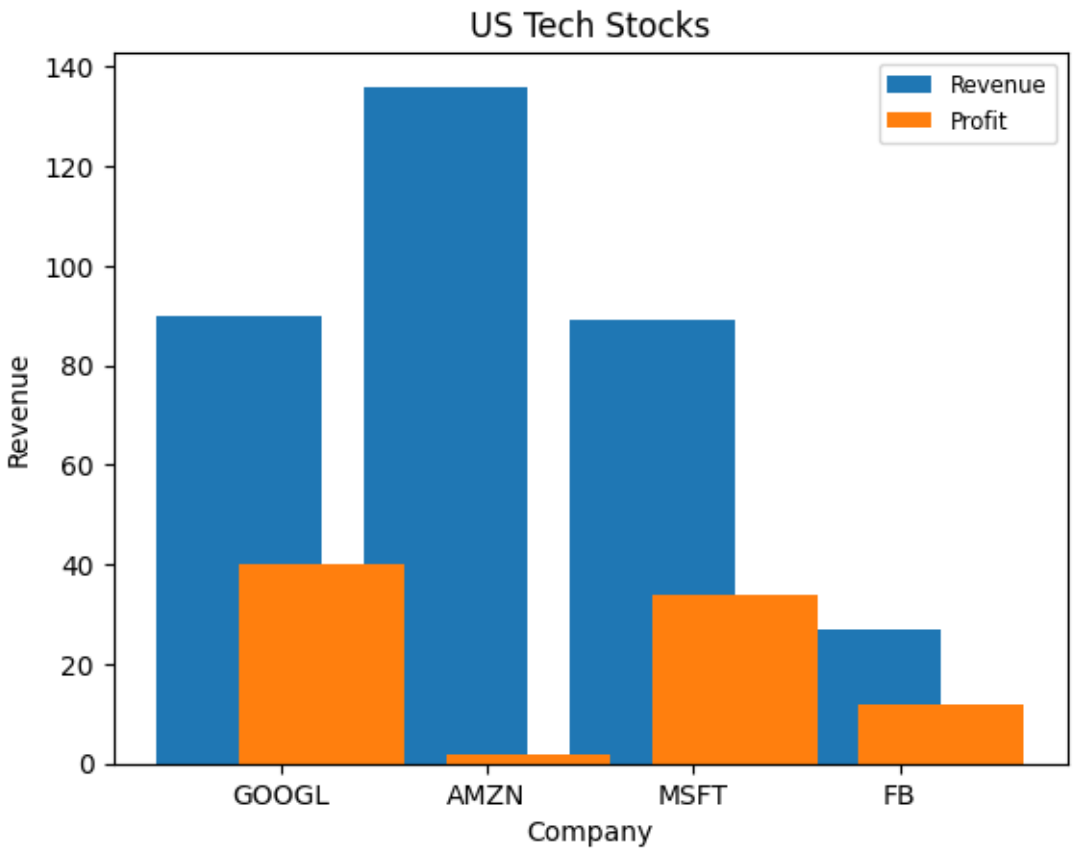
[ ]:
```
array([-0.2,  0.8,  1.8,  2.8])
```

[ ]:
```
y+0.2
```

[ ]:
```
array([0.2, 1.2, 2.2, 3.2])
```

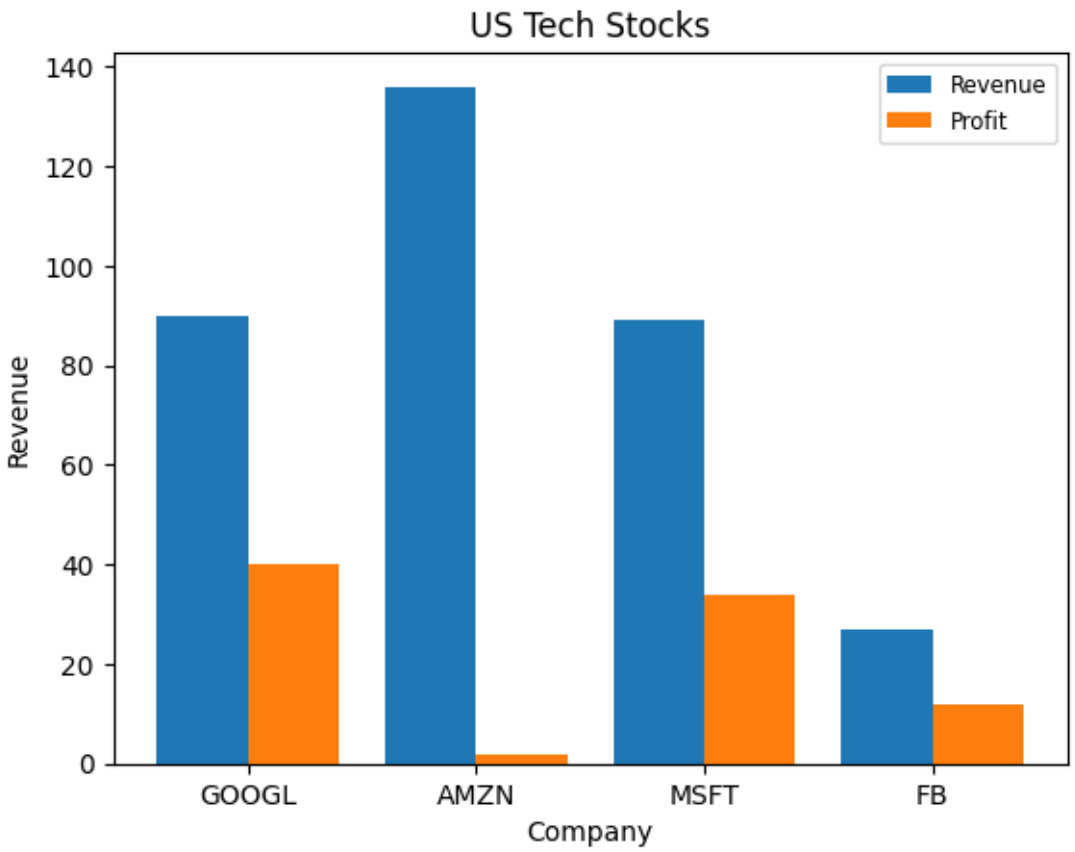
[ ]:
```
plt.xticks(y, company)
plt.xlabel('Company')
plt.ylabel('Revenue')
plt.title('US Tech Stocks')
plt.bar(y-0.2, revenue, label='Revenue')
plt.bar(y+0.2,profit, label='Profit')
plt.legend(fontsize='small', loc='best')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e08321480>
```



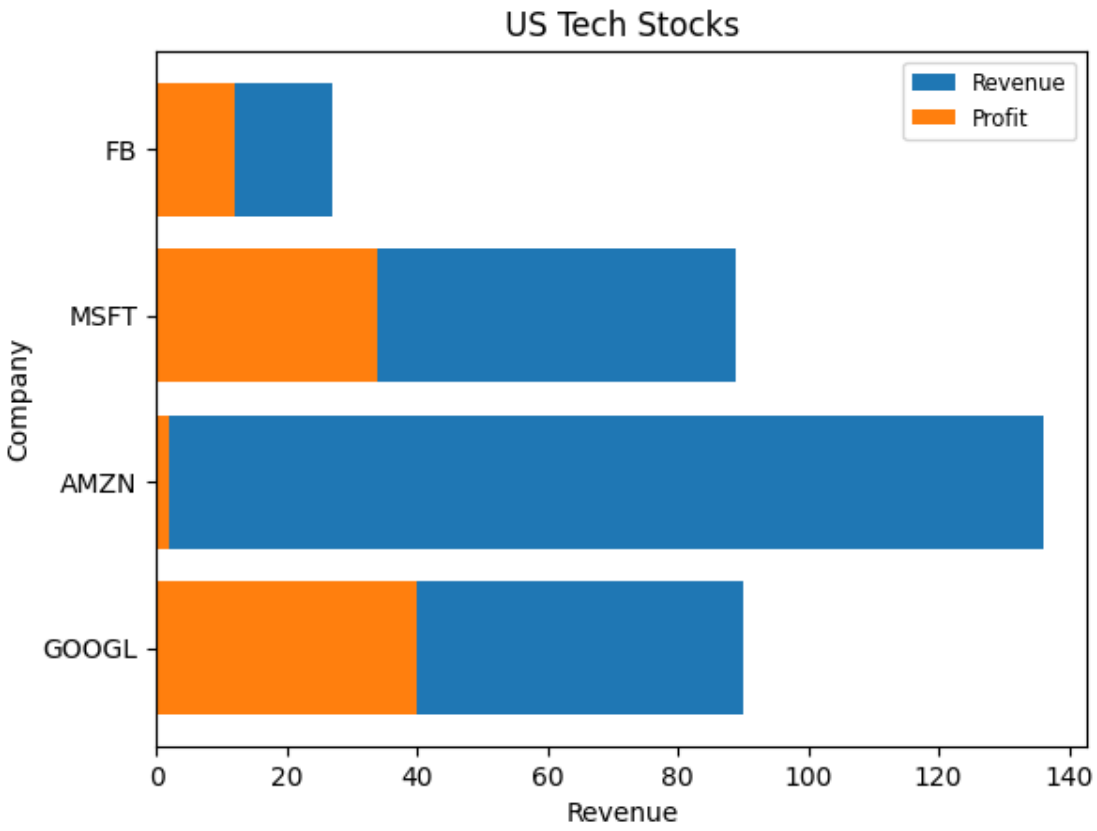
[ ]:
```
plt.xticks(y, company)
plt.xlabel('Company')
plt.ylabel('Revenue')
plt.title('US Tech Stocks')
plt.bar(y-0.2, revenue, width=0.4, label='Revenue')
plt.bar(y+0.2,profit, width=0.4, label='Profit')
plt.legend(fontsize='small', loc='best')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e0864ee60>
```



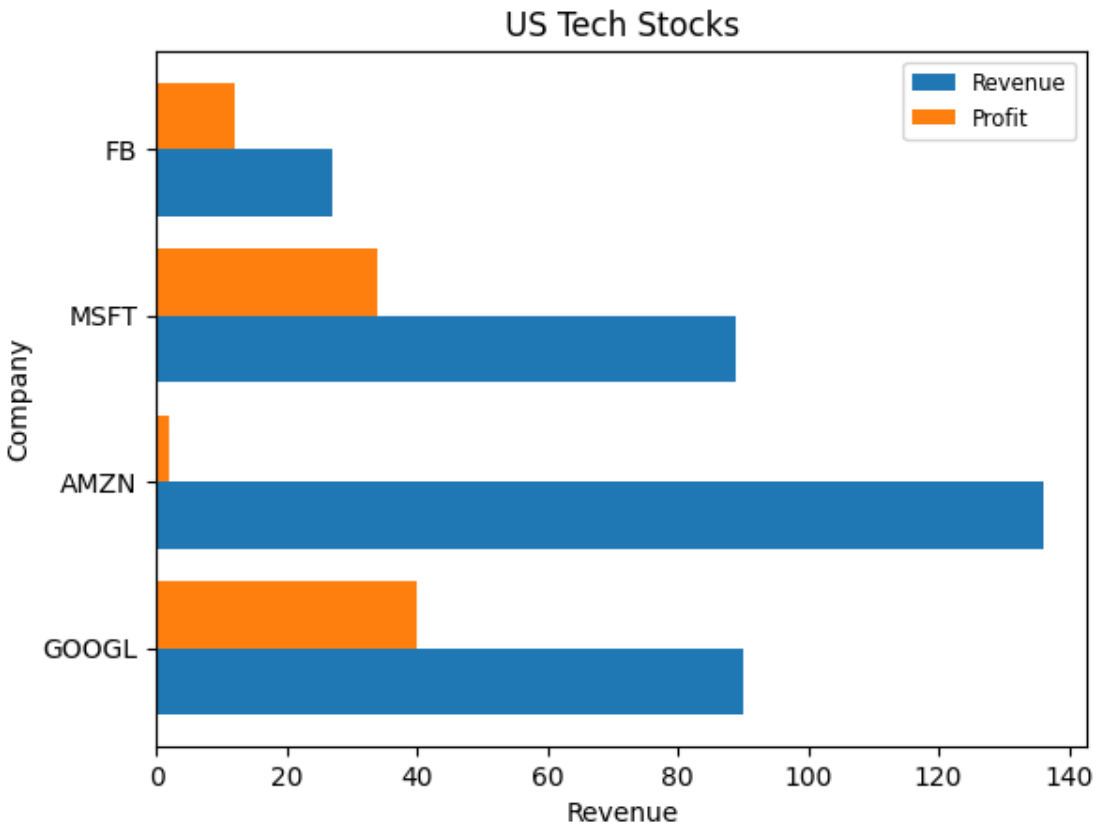
[ ]:
```
plt.yticks(y, company)
plt.ylabel('Company')
plt.xlabel('Revenue')
plt.title('US Tech Stocks')
plt.barh(y, revenue, label='Revenue')
plt.barh(y,profit, label='Profit')
plt.legend(fontsize='small', loc='best')
```

[ ]:
```
<matplotlib.legend.Legend at 0x788e081c3610>
```



[ ]:
```
plt.yticks(y, company)
plt.ylabel('Company')
plt.xlabel('Revenue')
plt.title('US Tech Stocks')
plt.barh(y-0.2, revenue, label='Revenue', height=0.4)
plt.barh(y+0.2,profit, label='Profit', height=0.4)
plt.legend(fontsize='small', loc='best')
```

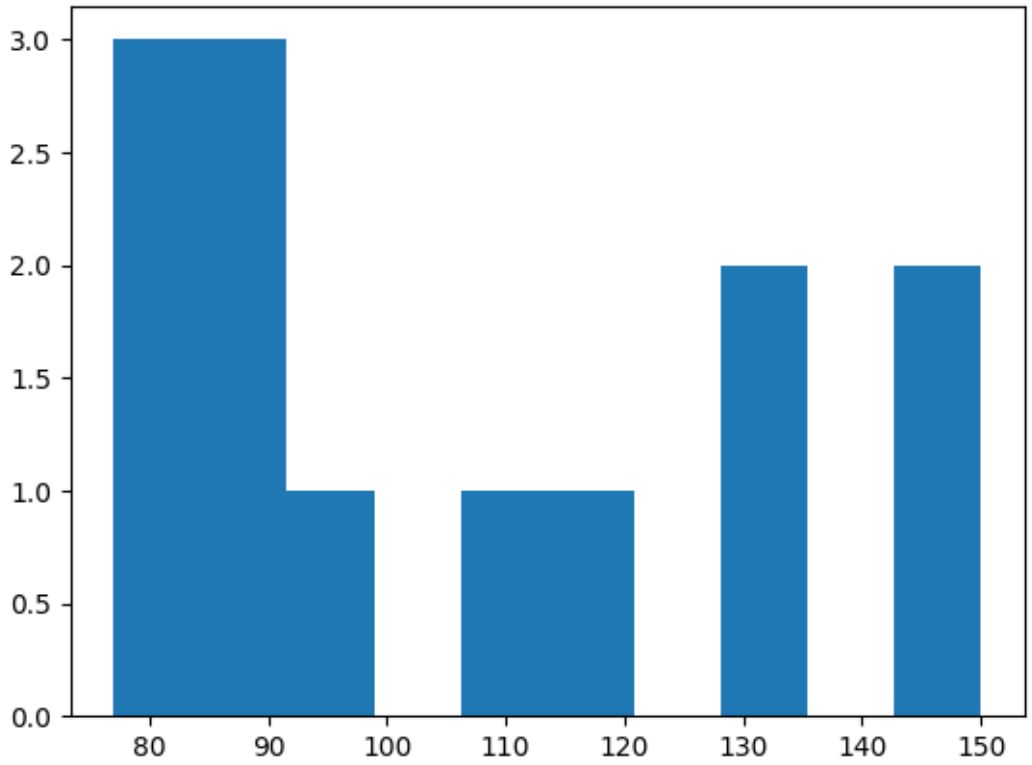
[ ]:
```
<matplotlib.legend.Legend at 0x788dffe2e740>
```




```
[ ]: blood_sugar = [113, 85, 90, 150, 149, 88, 93, 115, 135, 80, 77, 82, 129]
```

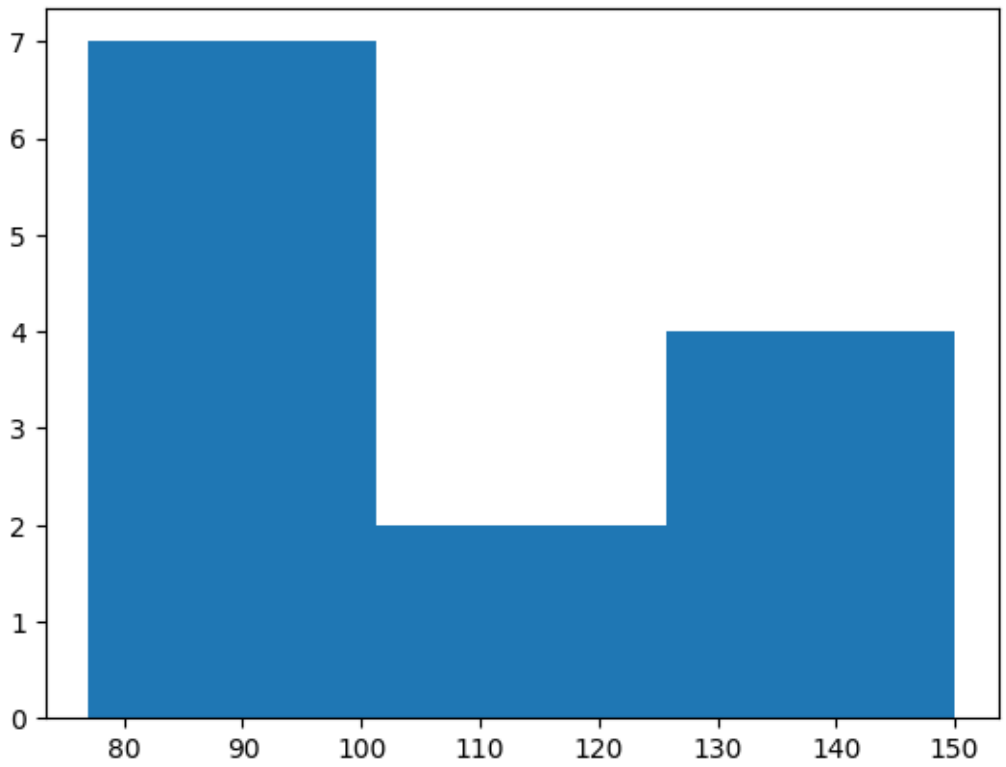
```
[ ]: plt.hist(blood_sugar)
```

```
[ ]: (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>)
```



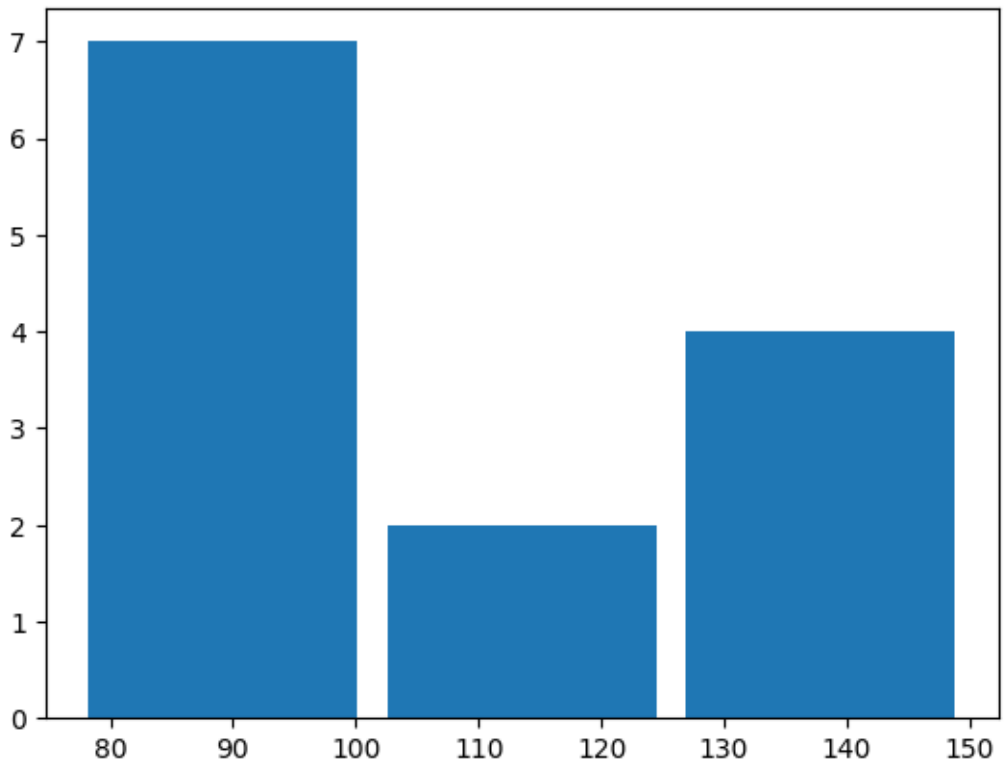
[ ]:
```
"""
  80-100: Normal
  100-125: Pre-diabetic
  80-100: Diabetic
"""
plt.hist(blood_sugar, bins = 3)
```

[ ]:
```
(array([7., 2., 4.]),
 array([ 77.        , 101.33333333, 125.66666667, 150.        ]),
 <BarContainer object of 3 artists>)
```



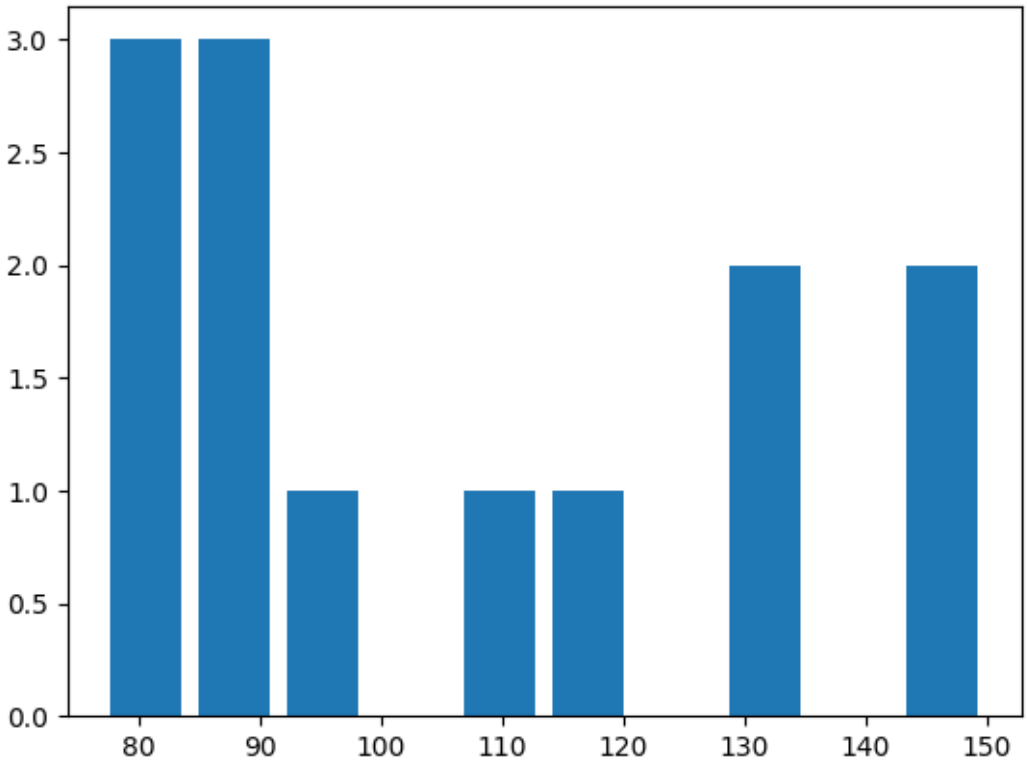
[ ]:
```
plt.hist(blood_sugar, bins = 3, rwidth=0.9)
```

[ ]:
```
(array([7., 2., 4.]),
 array([ 77.        , 101.33333333, 125.66666667, 150.        ]),
 <BarContainer object of 3 artists>)
```



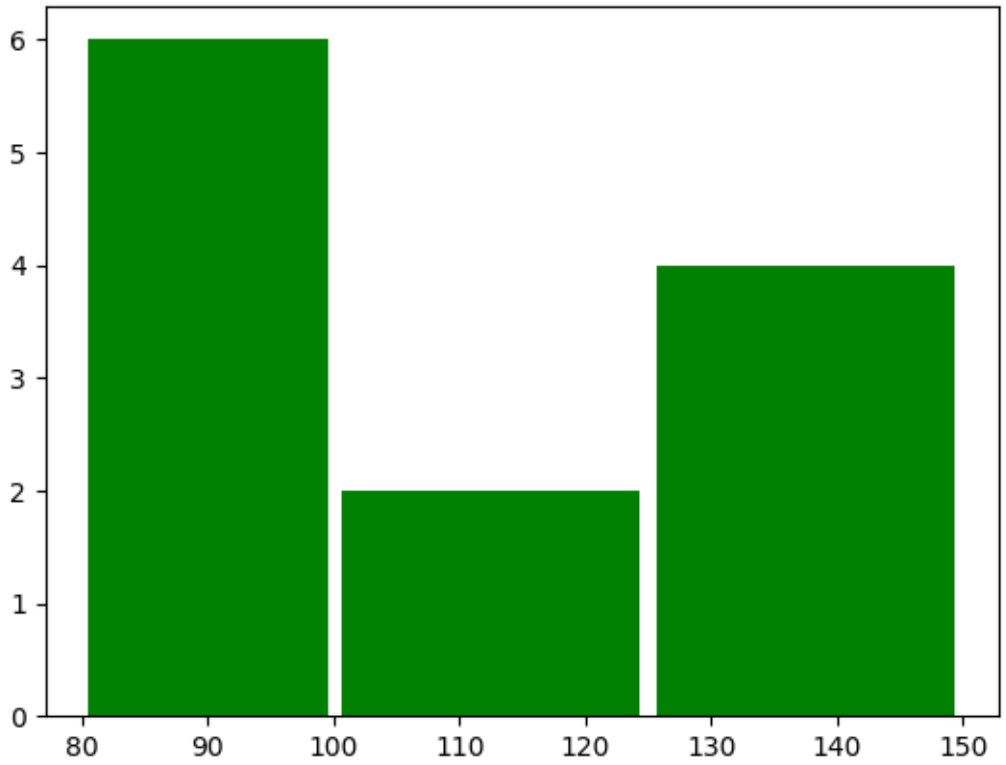
[ ]:
```
plt.hist(blood_sugar, rwidth=0.8)
```

[ ]:
```
(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>)
```



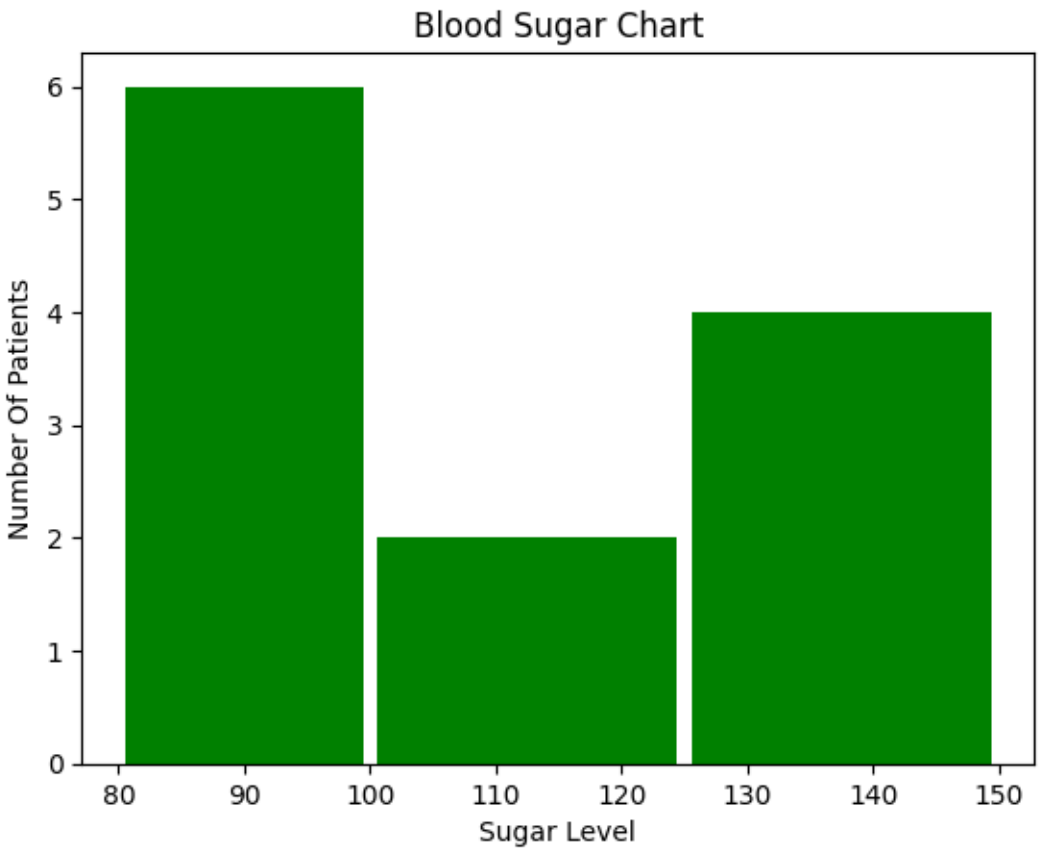
[ ]:
```
plt.hist(blood_sugar, bins=[80,100,125,150], rwidth=0.95, color='g')
```

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



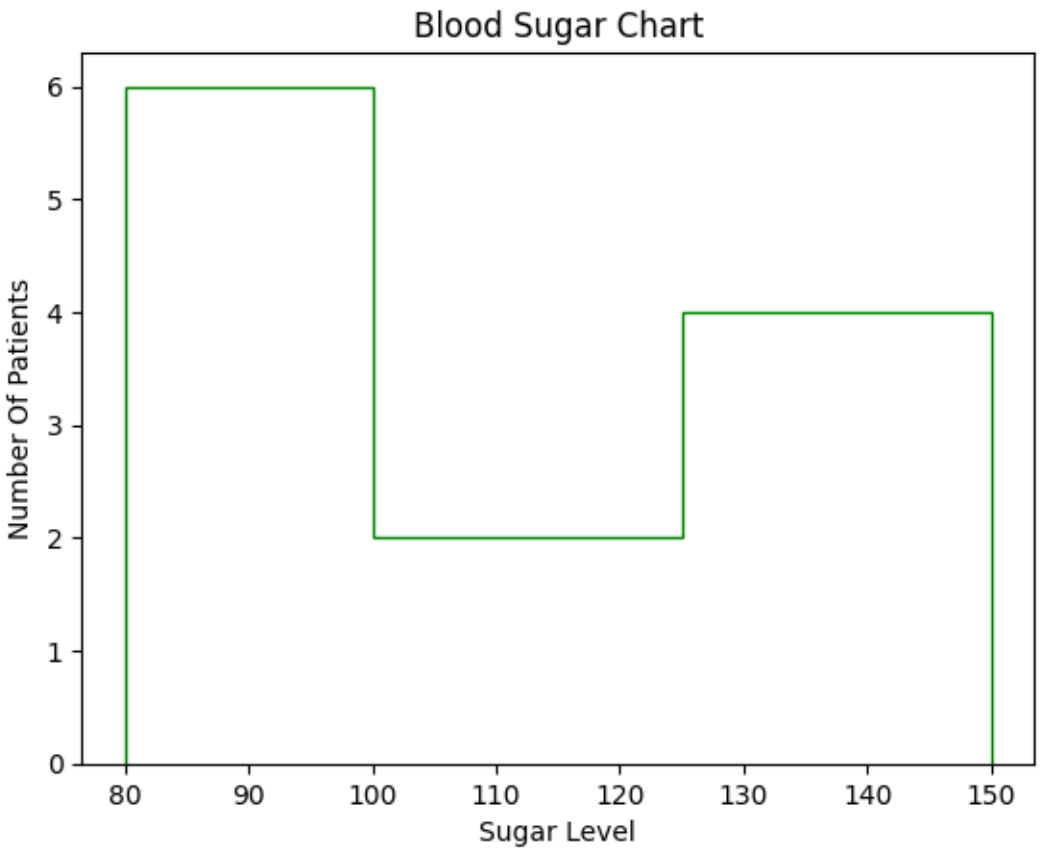
[ ]:
```
plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")
plt.hist(blood_sugar, bins=[80,100,125,150], rwidth=0.95, color='g')
```

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



[ ]:
```
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',␣
 ↪histtype='step')
```

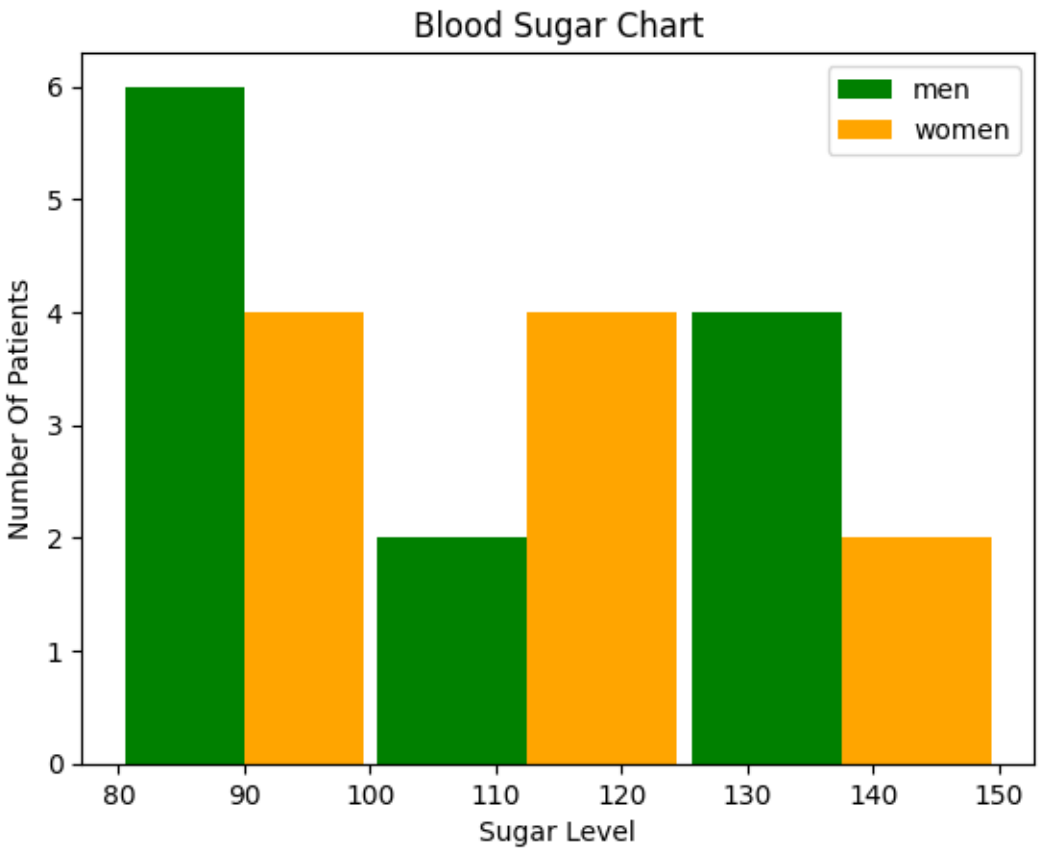
[ ]:
```
(array([6., 2., 4.]),
 array([ 80., 100., 125., 150.]),
 [<matplotlib.patches.Polygon at 0x788dffaa37c0>])
```



[ ]:
```
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]
```

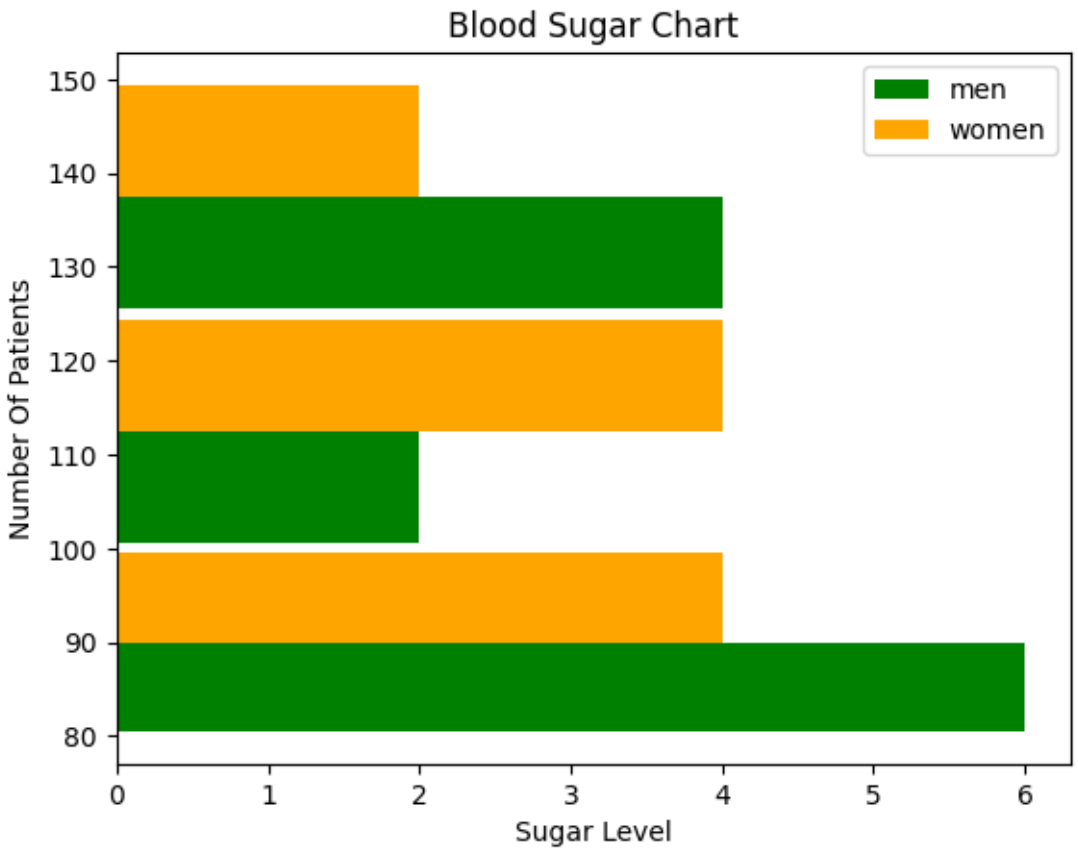
[ ]:
```
plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")
plt.hist([blood_sugar_men,blood_sugar_women], bins=[80,100,125,150], rwidth=0.
↪95, color=['green','orange'], label=['men','women'])
plt.legend()
```

[ ]:
```
<matplotlib.legend.Legend at 0x788dffa4f2e0>
```



[ ]:
```
plt.xlabel("Sugar Level")
plt.ylabel("Number Of Patients")
plt.title("Blood Sugar Chart")
plt.hist([blood_sugar_men,blood_sugar_women], bins=[80,100,125,150],
         rwidth=0.95, color=['green','orange'], label=['men','women'],
         orientation = 'horizontal')
plt.legend()
```

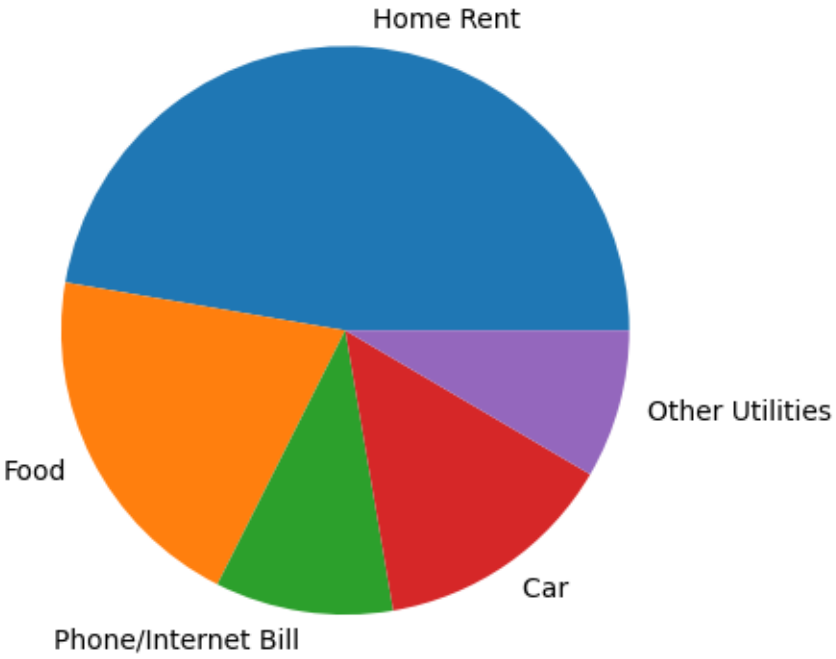
[ ]:
```
<matplotlib.legend.Legend at 0x788dff9acaf0>
```



[ ]:
```
exp_vals = [1400,600,300,410,250]
exp_labels = ["Home Rent","Food","Phone/Internet Bill","Car ","Other Utilities"]
```

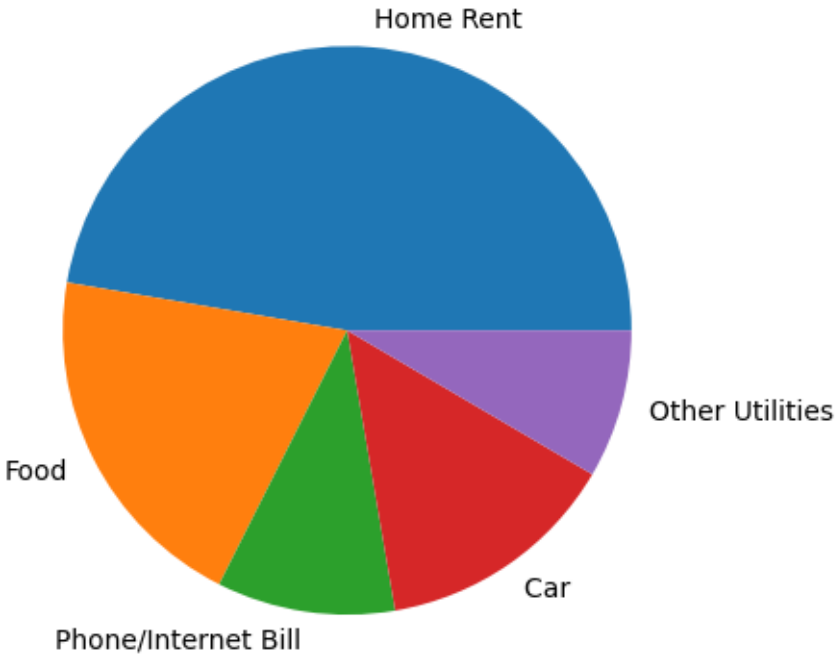
[ ]:
```
plt.pie(exp_vals, labels=exp_labels)
```

[ ]:
```
([<matplotlib.patches.Wedge at 0x788dffbe1ea0>,
  <matplotlib.patches.Wedge at 0x788dffbe06d0>,
  <matplotlib.patches.Wedge at 0x788dffb4a440>,
  <matplotlib.patches.Wedge at 0x788dffb48760>,
  <matplotlib.patches.Wedge at 0x788dff9b03d0>],
 [Text(0.09328656407206024, 1.0960372333838069, 'Home Rent'),
  Text(-0.9822184890776084, -0.4952240298229684, 'Food'),
  Text(-0.16284704617934698, -1.0878790555712807, 'Phone/Internet Bill'),
  Text(0.6256100334857941, -0.9047718419590123, 'Car '),
  Text(1.0615045230766318, -0.28845822485734873, 'Other Utilities')])
```

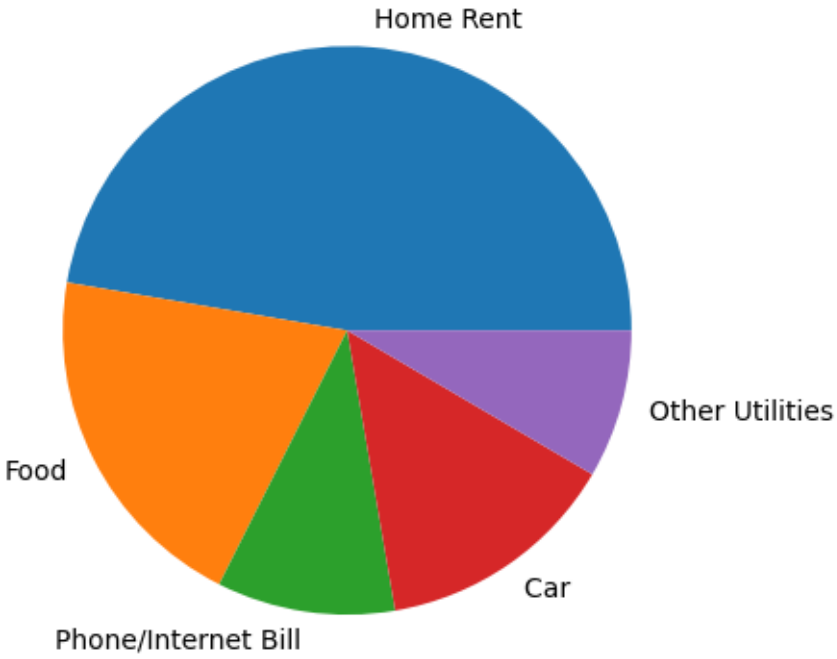


[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels)
```

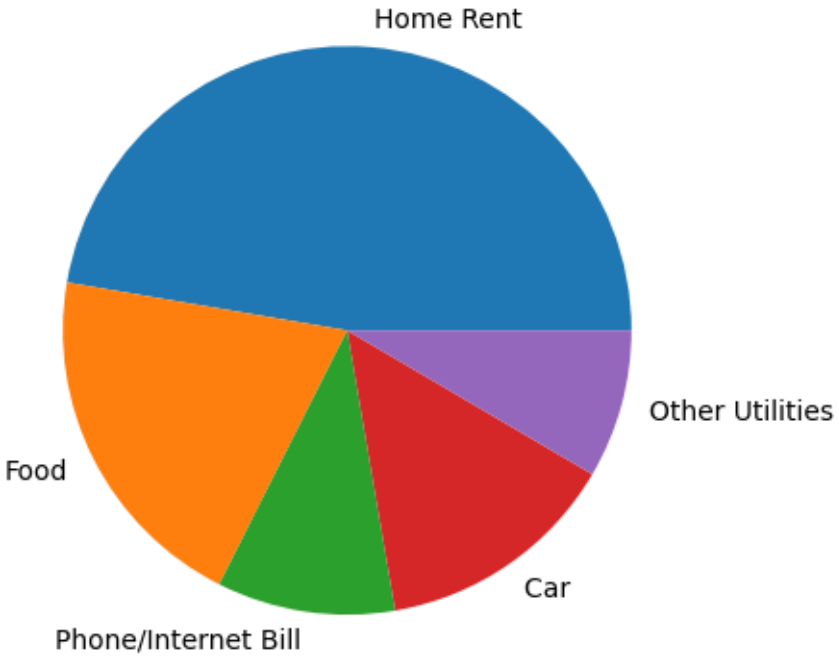
[ ]:
```
([<matplotlib.patches.Wedge at 0x788dffa69c90>,
  <matplotlib.patches.Wedge at 0x788dff96cb50>,
  <matplotlib.patches.Wedge at 0x788dff71c850>,
  <matplotlib.patches.Wedge at 0x788dff71cf40>,
  <matplotlib.patches.Wedge at 0x788dff71e590>],
 [Text(0.09328656407206024, 1.0960372333838069, 'Home Rent'),
  Text(-0.9822184890776084, -0.4952240298229684, 'Food'),
  Text(-0.16284704617934698, -1.0878790555712807, 'Phone/Internet Bill'),
  Text(0.6256100334857941, -0.9047718419590123, 'Car '),
  Text(1.0615045230766318, -0.28845822485734873, 'Other Utilities')])
```



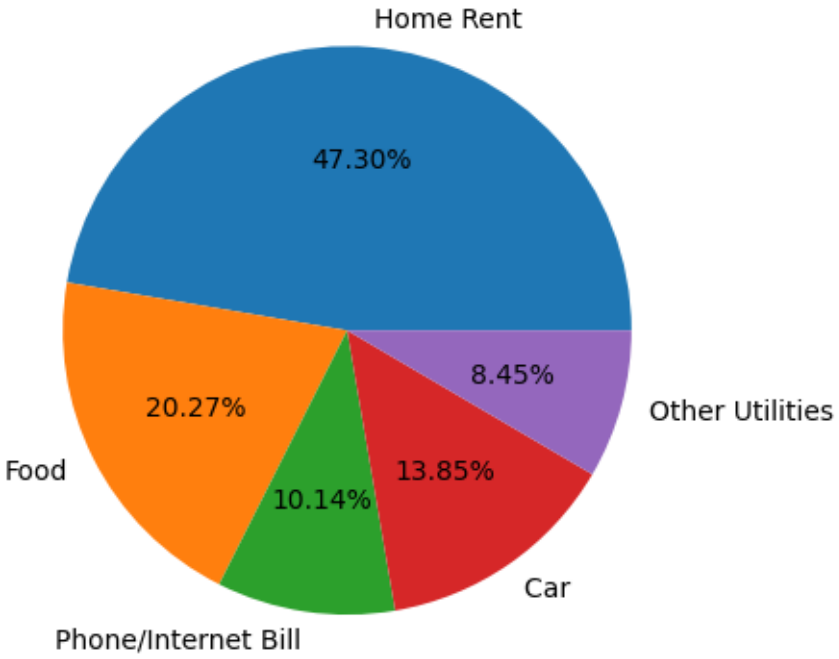
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels)
plt.show()
```



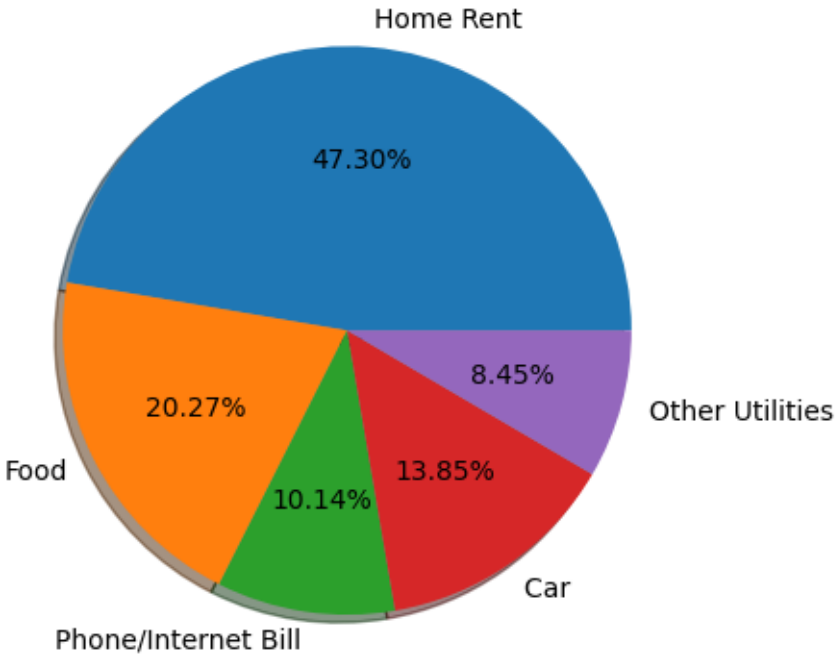
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1)
plt.show()
```



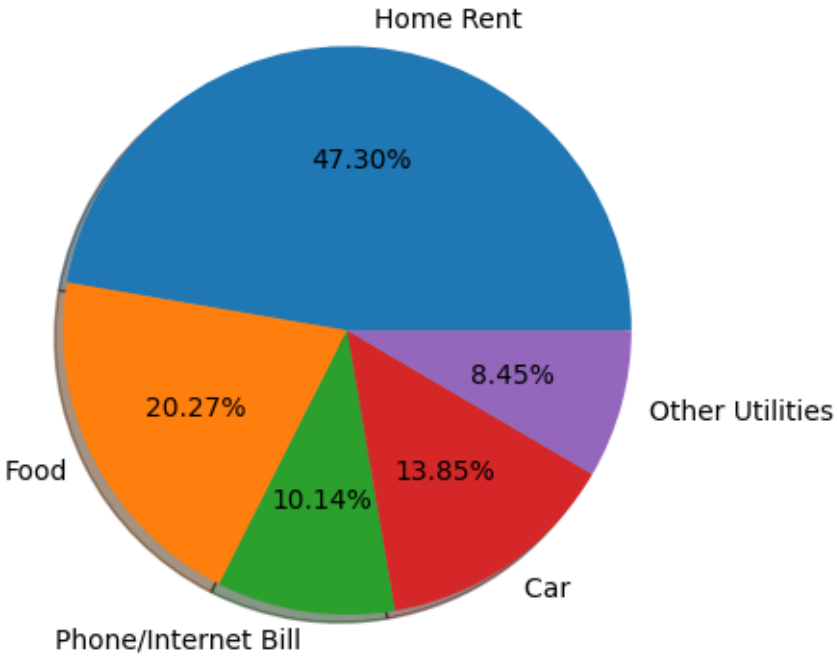
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%")
plt.show()
```



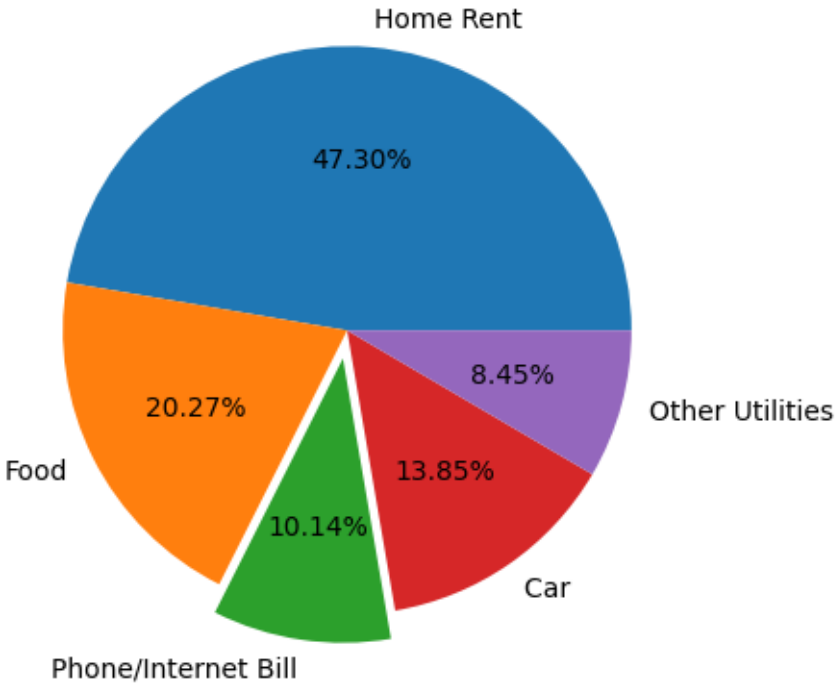
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%", shadow=True)
plt.show()
```



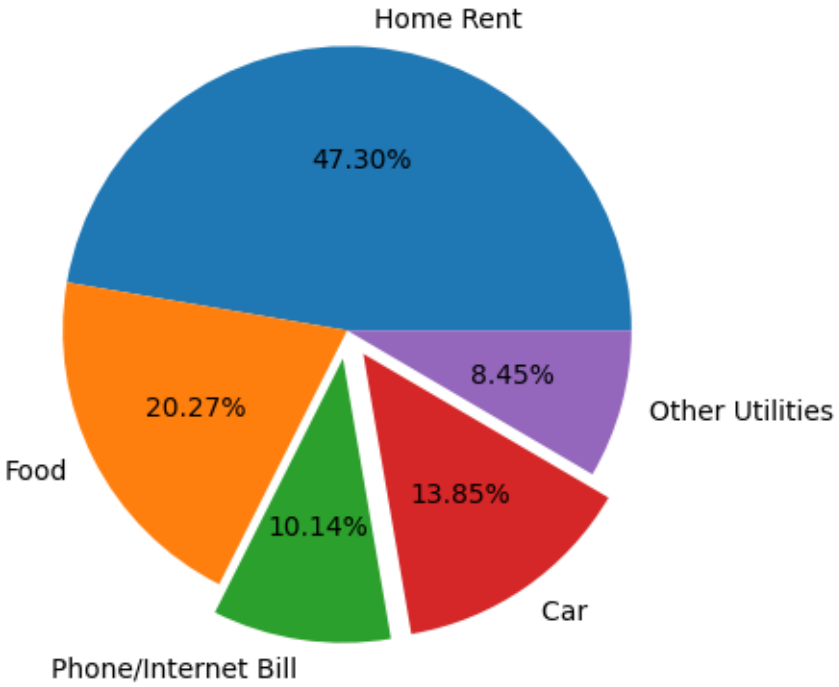
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%", shadow=True,␣
↪explode=[0,0,0,0,0])
plt.show()
```



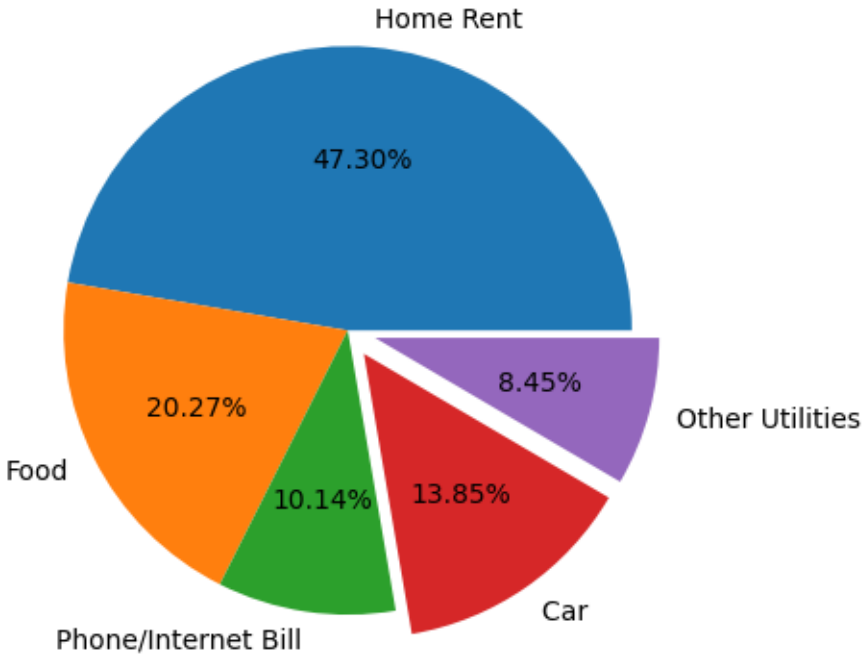
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0.1,0,0])
plt.show()
```



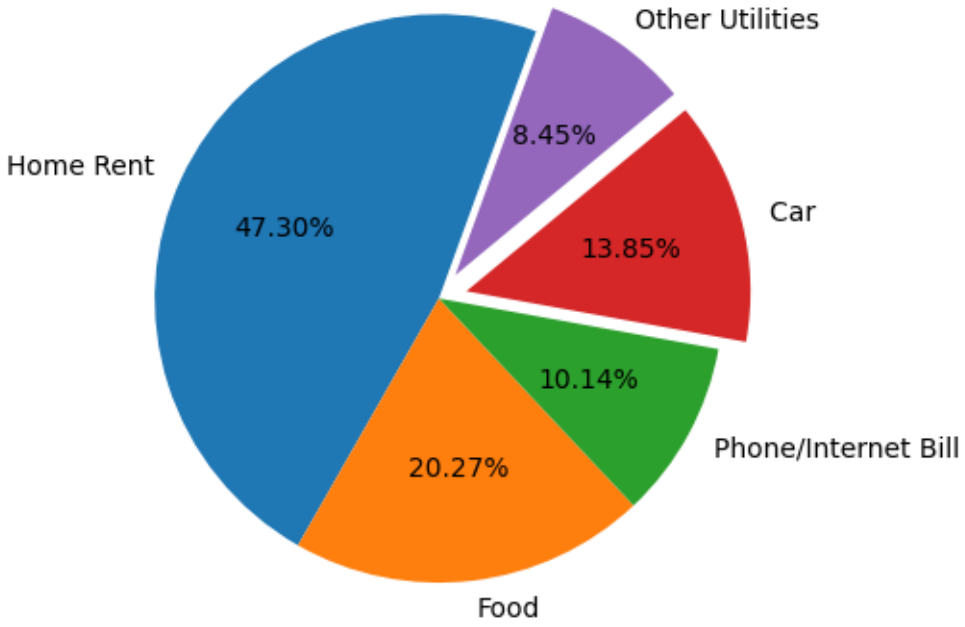
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0.1,0.1,0])
plt.show()
```



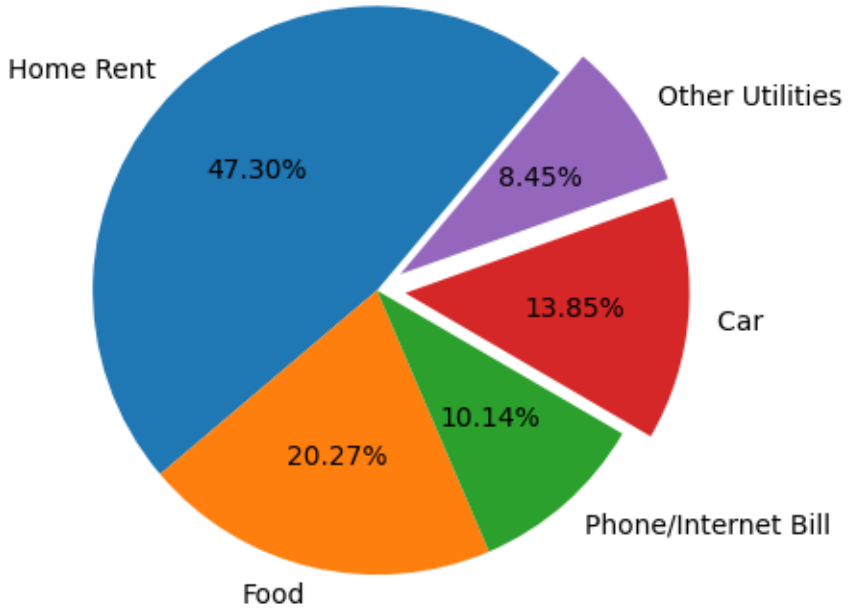
[132]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
↪explode=[0,0,0,0.1,0.1])
plt.show()
```



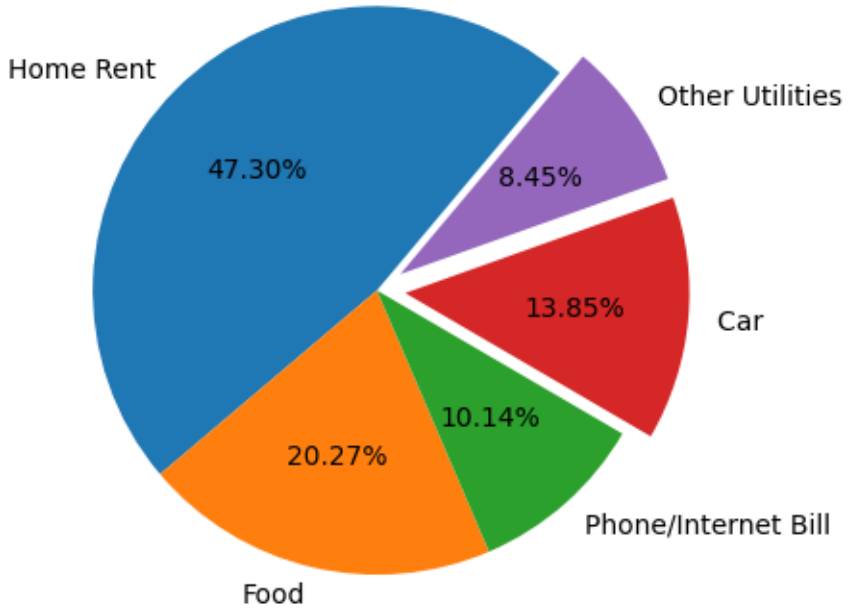
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0,0.1,0.1], startangle = 70)
plt.show()
```



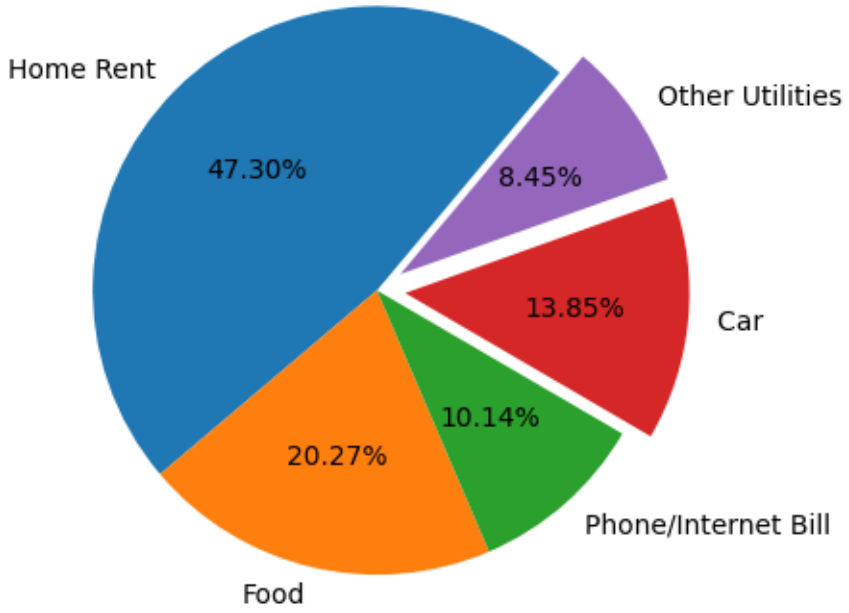
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0,0.1,0.1], startangle = 50)
plt.show()
```



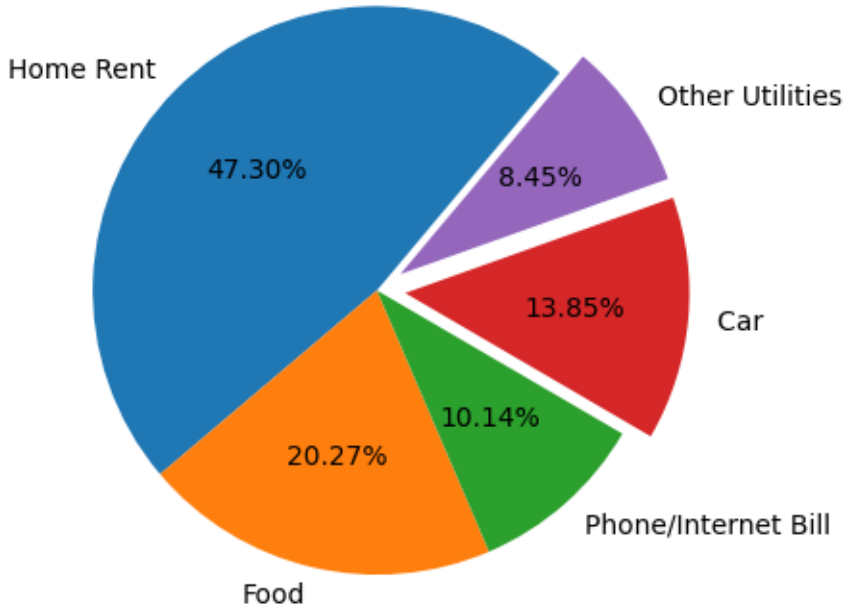
[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0,0.1,0.1], startangle = 50)
plt.savefig('pie1.png', bbox_inches='tight')
```



[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0,0.1,0.1], startangle = 50)
plt.savefig('pie2.png', bbox_inches='tight', pad_inches = 1)
```

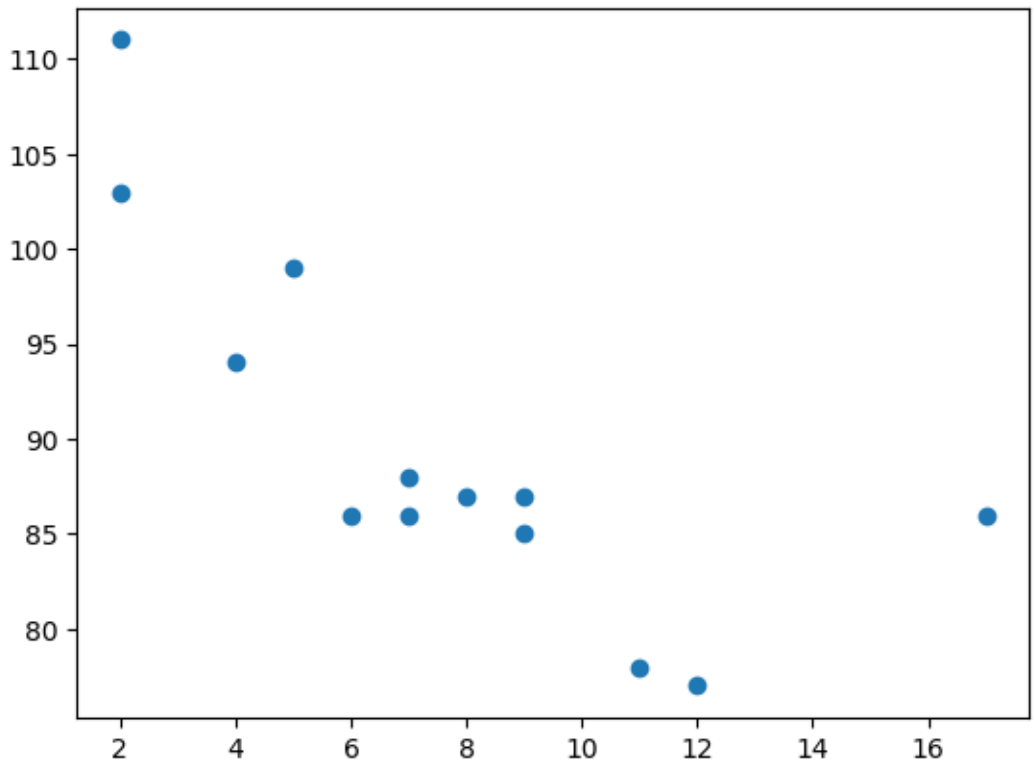


[ ]:
```
plt.axis('equal')
plt.pie(exp_vals, labels=exp_labels, radius=1, autopct="%0.2f%%",␣
  ↪explode=[0,0,0,0.1,0.1], startangle = 50)
plt.savefig('pie3.png', bbox_inches='tight', pad_inches = 1, transparent=True)
```

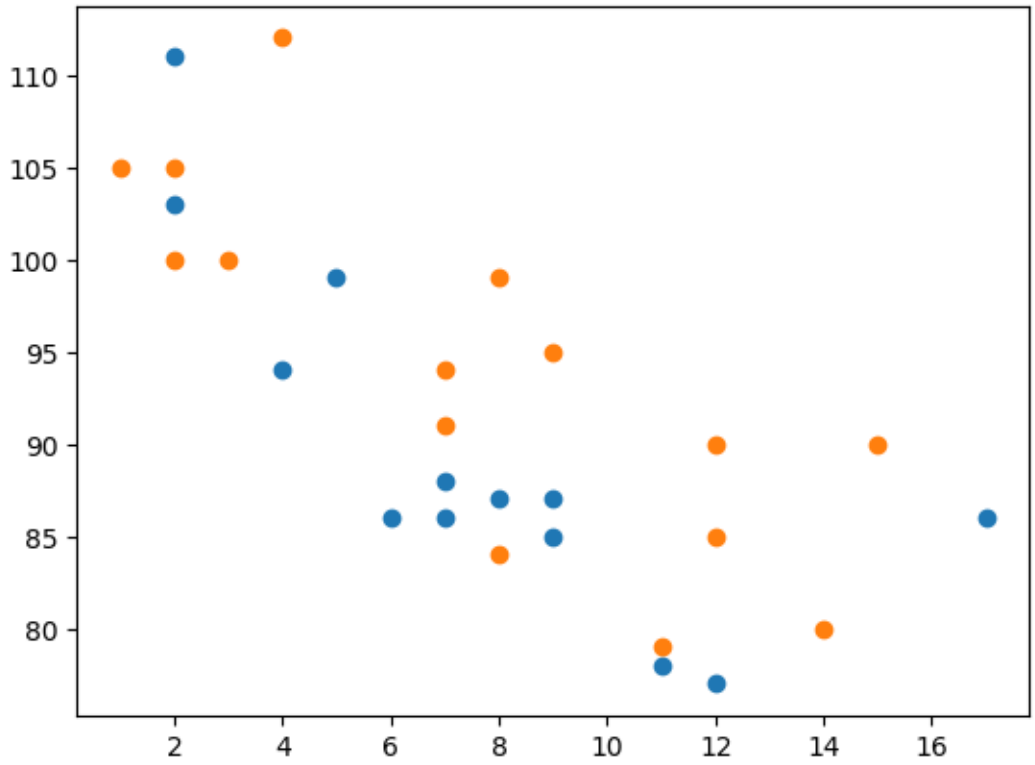


[133]:
```
x = np.array([5,7,8,7,2,17,2,9,4,11,12,9,6])
y = np.array([99,86,87,88,111,86,103,87,94,78,77,85,86])
```

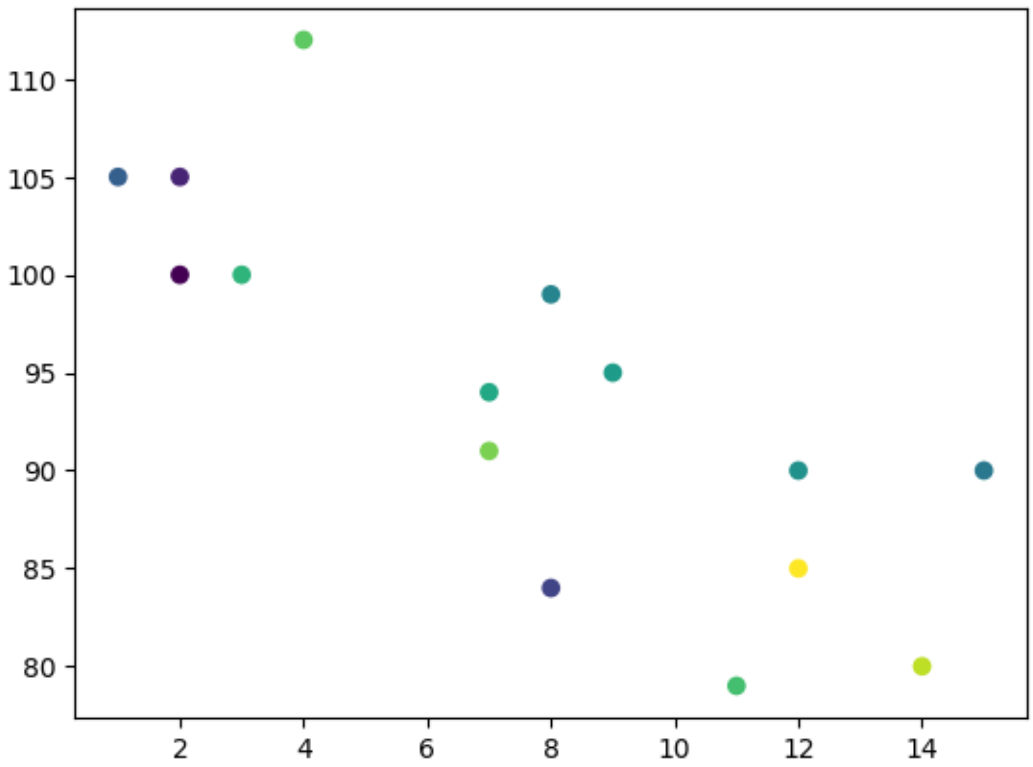
[134]:
```
plt.scatter(x, y)
plt.show()
```



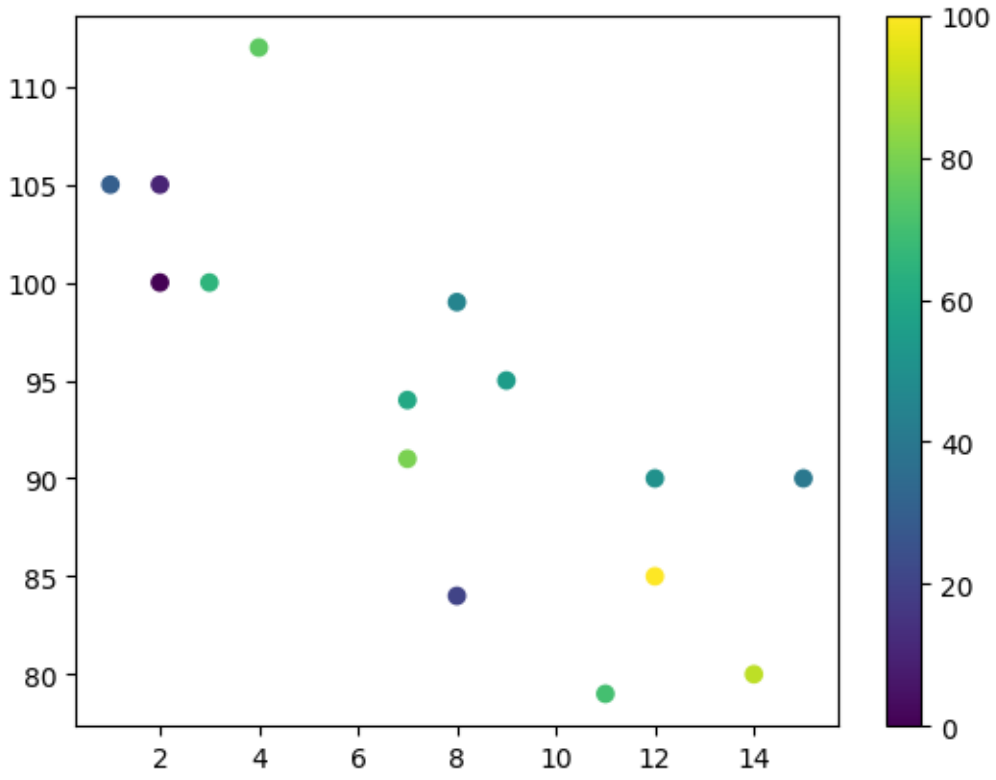
[135]:
```
#day one, the age and speed of 13 cars:
x = np.array([5,7,8,7,2,17,2,9,4,11,12,9,6])
y = np.array([99,86,87,88,111,86,103,87,94,78,77,85,86])
plt.scatter(x, y)

#day two, the age and speed of 15 cars:
x = np.array([2,2,8,1,15,8,12,9,7,3,11,4,7,14,12])
y = np.array([100,105,84,105,90,99,90,95,94,100,79,112,91,80,85])
plt.scatter(x, y)

plt.show()
```



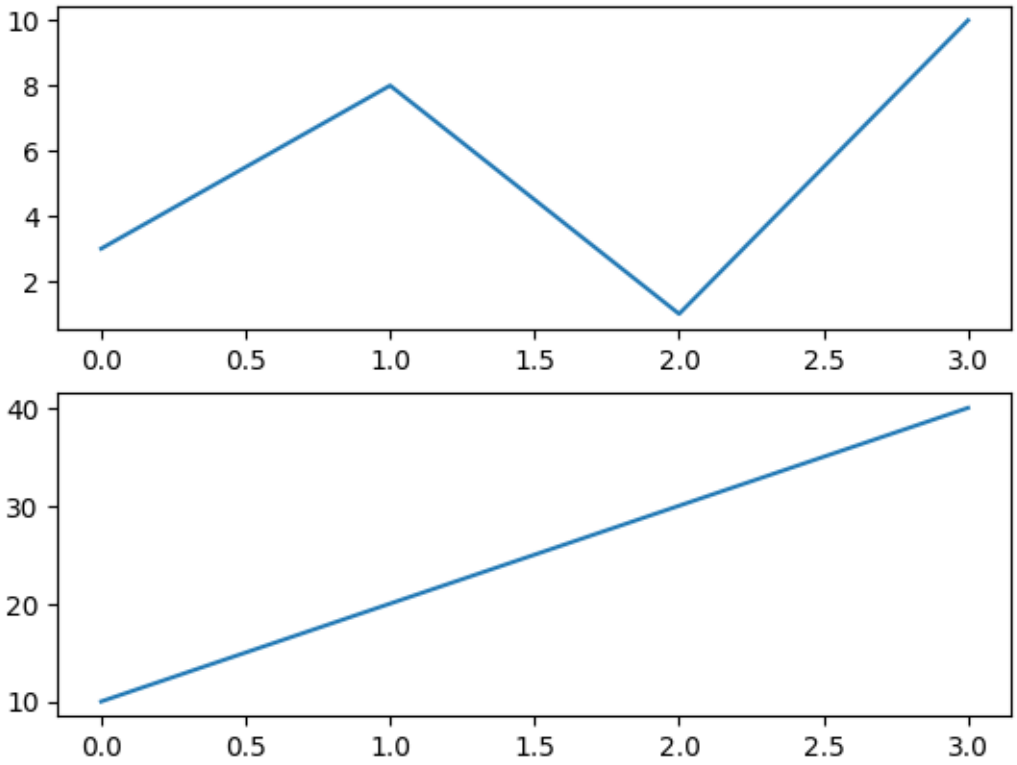
[138]:
```
colors = np.array([0, 10, 20, 30, 40, 45, 50, 55, 60, 65, 70, 75, 80, 90, 100])
plt.scatter(x,y, c=colors, cmap='viridis')
plt.show()
```



[140]:
```
colors = np.array([0, 10, 20, 30, 40, 45, 50, 55, 60, 65, 70, 75, 80, 90, 100])
plt.scatter(x,y, c=colors, cmap='viridis')
plt.colorbar()
plt.show()
```



[141]:
```
#plot 1:
x = np.array([0, 1, 2, 3])
y = np.array([3, 8, 1, 10])

plt.subplot(2, 1, 1)
plt.plot(x,y)

#plot 2:
x = np.array([0, 1, 2, 3])
y = np.array([10, 20, 30, 40])

plt.subplot(2, 1, 2)
plt.plot(x,y)

plt.show()
```


10
8
6
4
2
0.0
0.5
1.0
1.5
2.0
2.5
3.0
40
30
20
10
0.0
0.5
1.0
1.5
2.0
2.5
3.0