Matplotlib

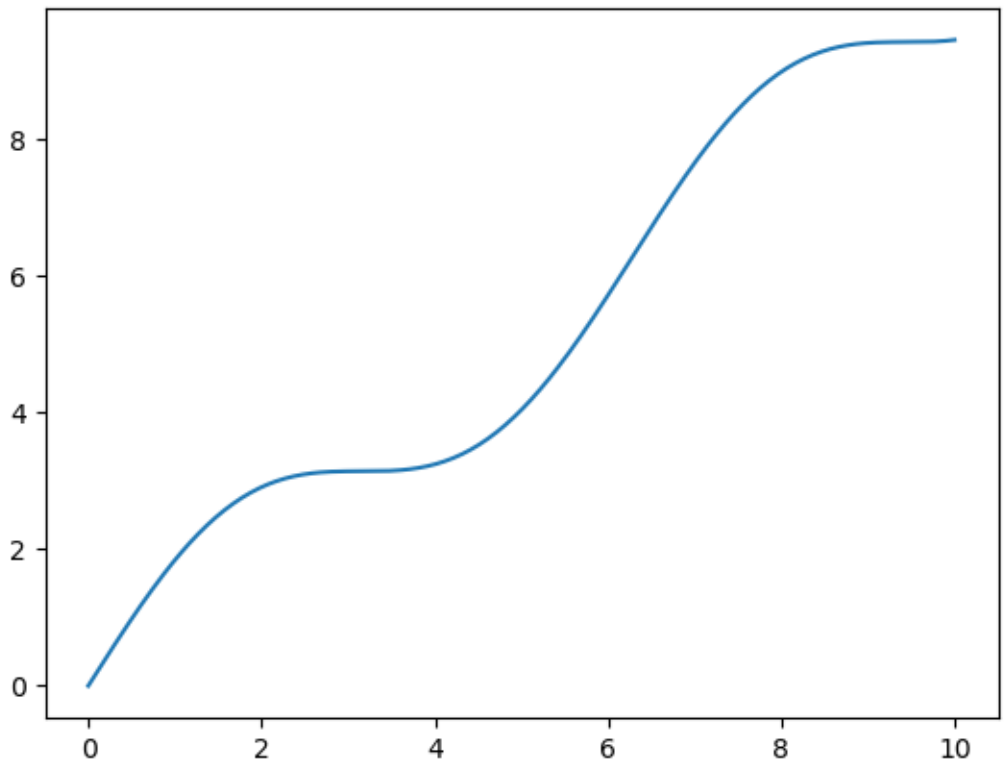
March 20, 2025

1 Note: The plots might not be complete

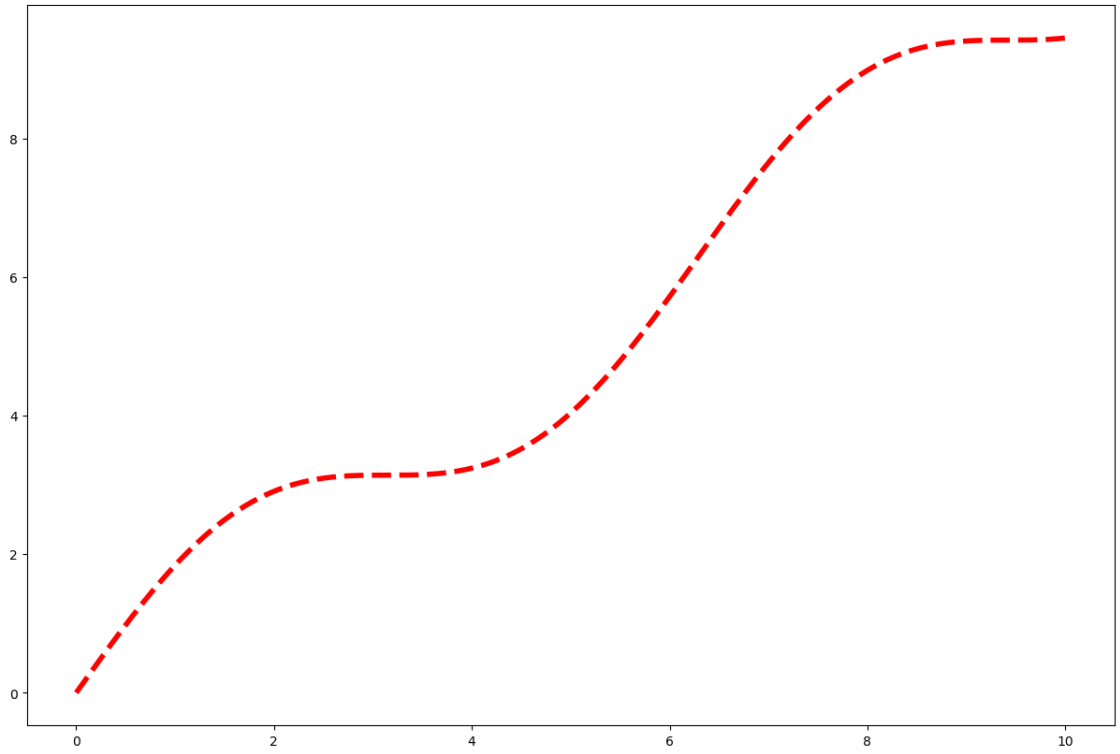
[ ]:

[22]:
```
import numpy as np
import pandas as pd
import matplotlib
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
%matplotlib inline

import warnings
warnings.filterwarnings('ignore')
```

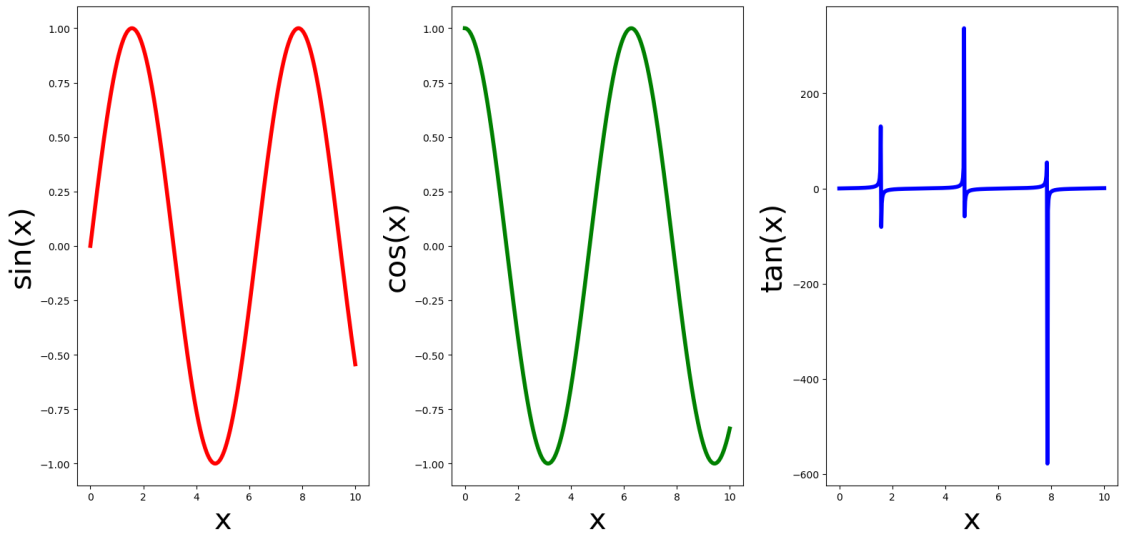
[5]:
```
fig, ax = plt.subplots()
# x data
x = np.linspace(0, 10, 300)
# y data
y = np.sin(x) + x
# creates the plot
ax.plot(x, y)
# this will show your plot in case your environment is not interactive
fig.show()
```



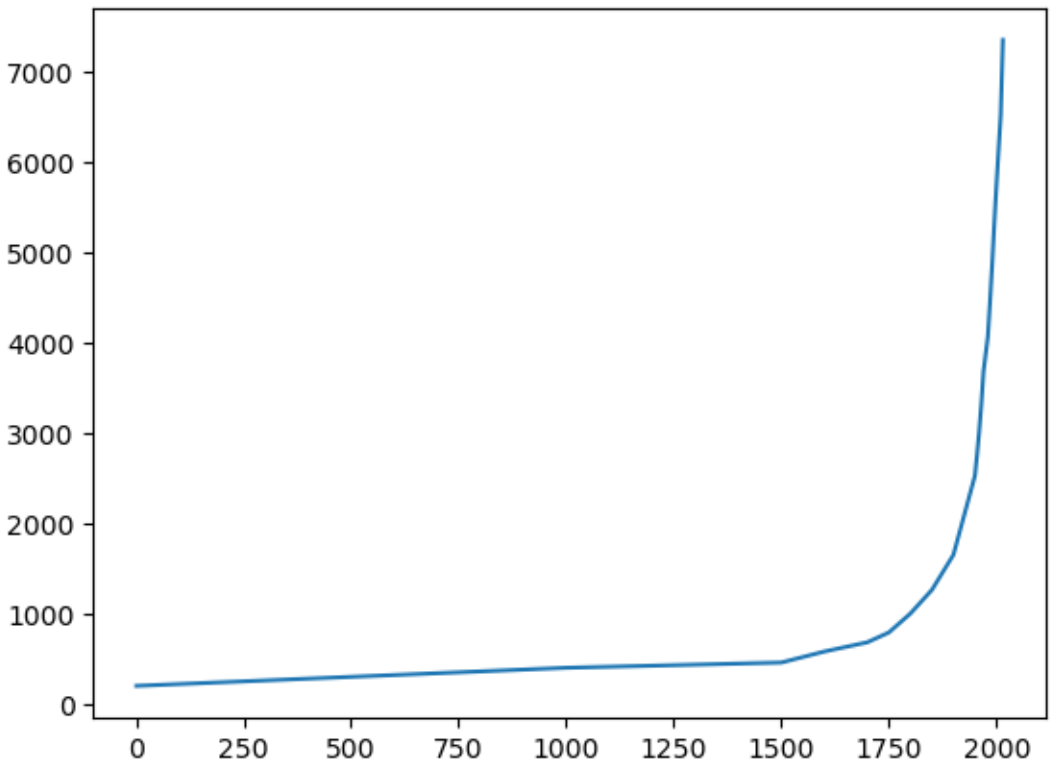
[6]:
```
color = 'r'
linestyle = 'dashed'
linewidth = 4
fig, ax = plt.subplots(figsize=(15,10))
fig.suptitle('Our First plot', fontsize=40)
ax.plot(x, y, c=color, linestyle=linestyle, linewidth=linewidth)
plt.show()
```



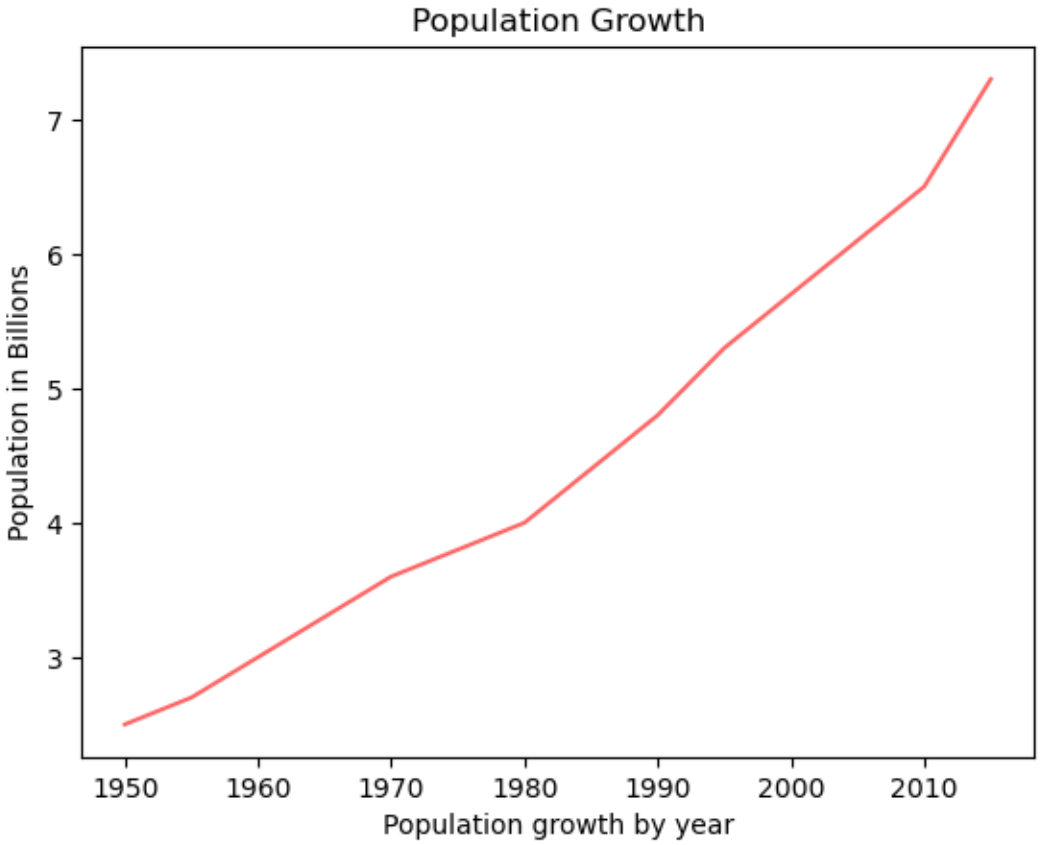
[8]:
```
fig, axes = plt.subplots(1, 3, figsize=(16,8))
ax1, ax2, ax3 = axes
x = np.linspace(0,10,500)
y1 = np.sin(x)
y2 = np.cos(x)
y3 = np.tan(x)

ax1.set_ylabel('sin(x)', fontsize=30)
ax1.set_xlabel('x', fontsize=30)
ax2.set_ylabel('cos(x)', fontsize=30)
ax2.set_xlabel('x', fontsize=30)
ax3.set_ylabel('tan(x)', fontsize=30)
ax3.set_xlabel('x', fontsize=30)
fig.tight_layout(pad=2)

ax1.plot(x, y1, c='r', linewidth=4)
ax2.plot(x, y2, c='g', linewidth=4)
ax3.plot(x, y3, c='b', linewidth=4)
plt.show()
```



[9]:
```
years=[1,1000,1500,1600,1700,1750,1800,1850,1900,1950,1955,1960,1965,1970,1980,1985,1990,
       1995,2000,2005,2010,2015]
pops=[200,400,458,580,682,791,1000,1262,1650,2525,2758,3018,3322,3682,
      4061,4440,4853,5310,5735,6127,6520,7349]
plt.plot(years,pops)
plt.show()
```

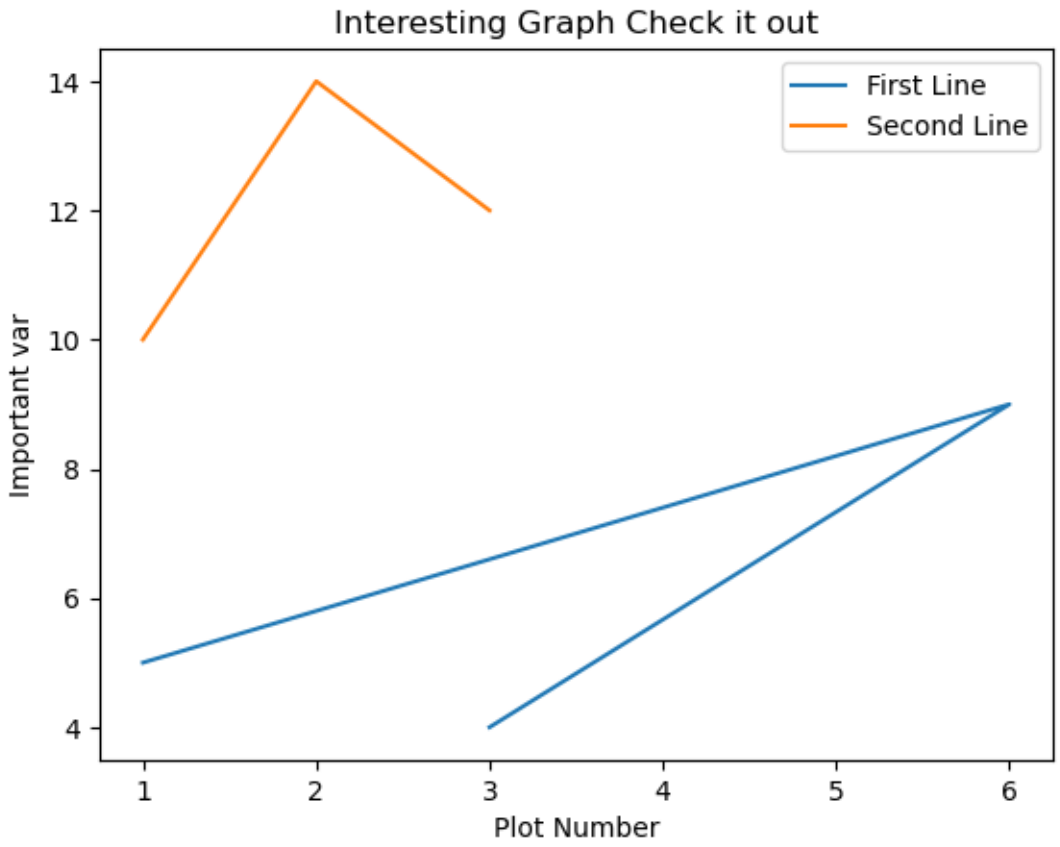


[10]:
```
years=[1950,1955,1960,1965,1970,1980,1985,1990,1995,2000,2005,2010,2015]
pops=[2.5,2.7,3.0,3.3,3.6,4.0,4.4,4.8,5.3,5.7,6.1,6.5,7.3]
plt.plot(years,pops,color=(255/255,100/255,100/255))
plt.ylabel("Population in Billions")
plt.xlabel("Population growth by year")
plt.title("Population Growth")
plt.show()
```

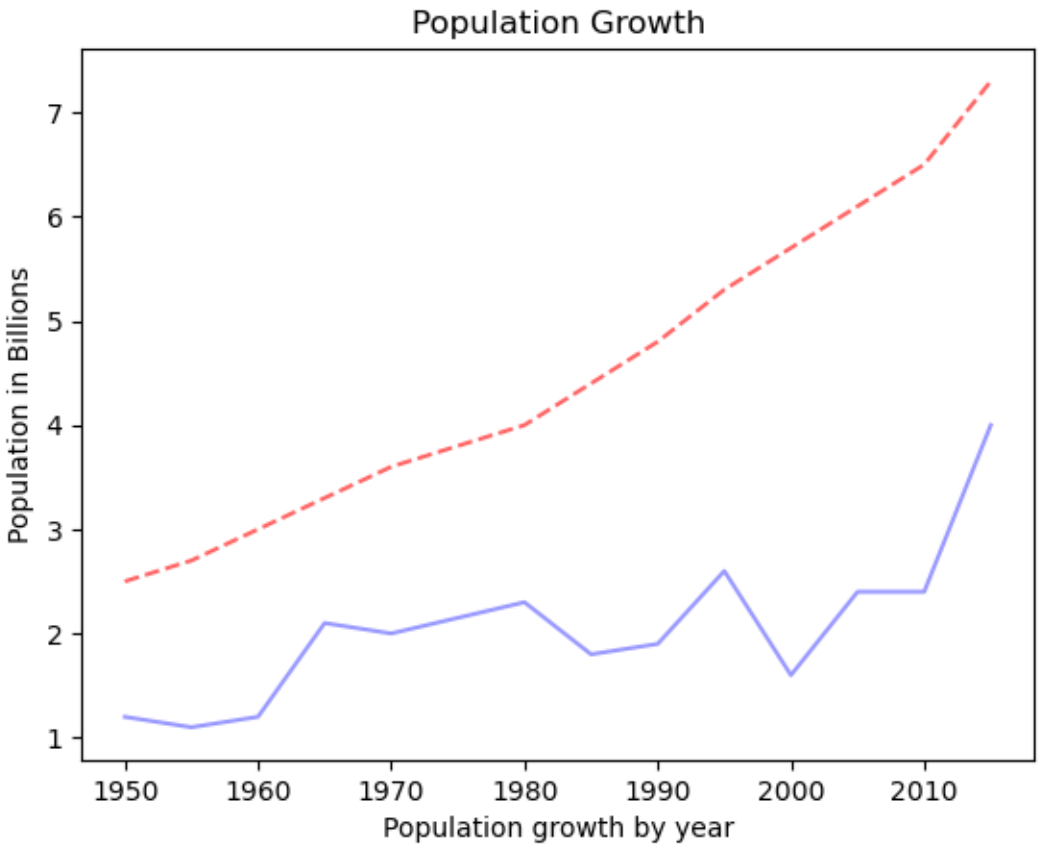


[11]:
```
x = [1,6,3]
y = [5,9,4]

x2 = [1,2,3]
y2 = [10,14,12]

plt.plot(x, y, label='First Line')
plt.plot(x2, y2, label='Second Line')
plt.xlabel('Plot Number')
```

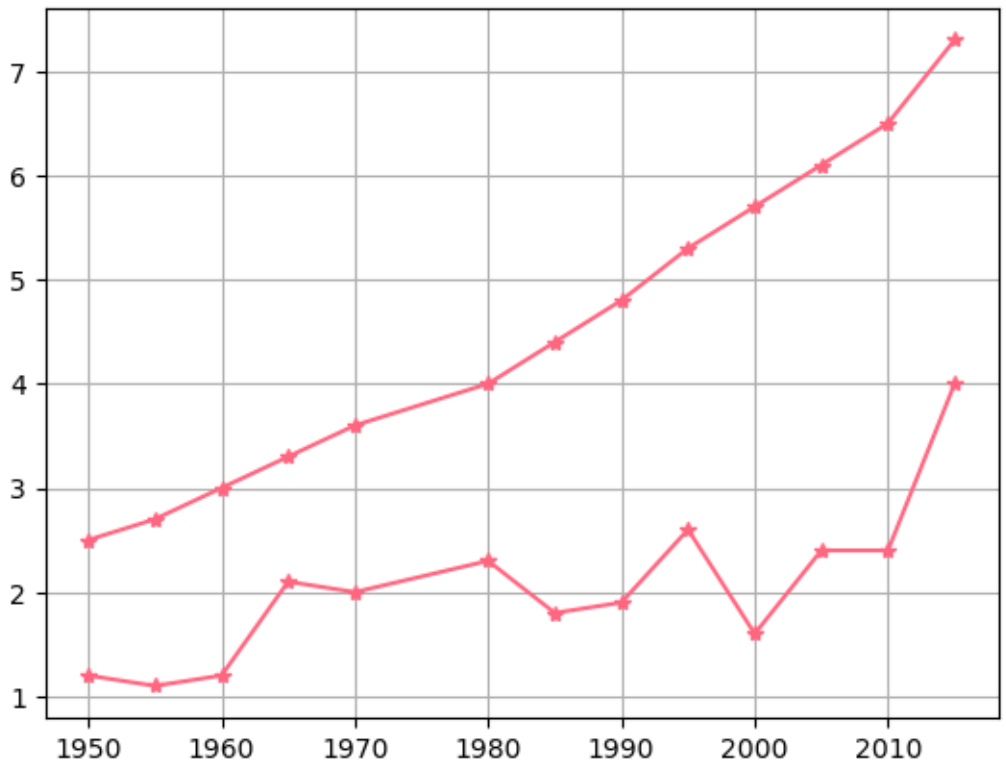
```
plt.ylabel('Important var')
plt.title('Interesting Graph Check it out')
plt.legend()
plt.show()
```



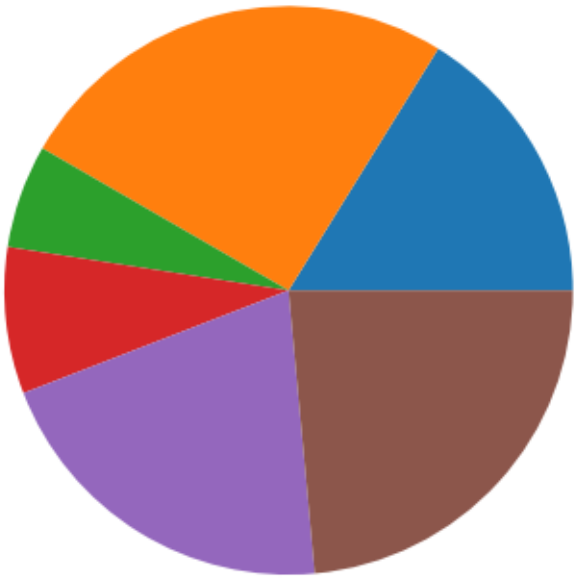
[12]:
```
years=[1950,1955,1960,1965,1970,1980,1985,1990,1995,2000,2005,2010,2015]
pops=[2.5,2.7,3.0,3.3,3.6,4.0,4.4,4.8,5.3,5.7,6.1,6.5,7.3]
death=[1.2,1.1,1.2,2.1,2.0,2.3,1.8,1.9,2.6,1.6,2.4,2.4,4.0]
plt.plot(years,pops,'--',color=(255/255,100/255,100/255))
plt.plot(years,death,color=(.6,.6,1))
plt.ylabel("Population in Billions")
plt.xlabel("Population growth by year")
plt.title("Population Growth")
plt.show()
```



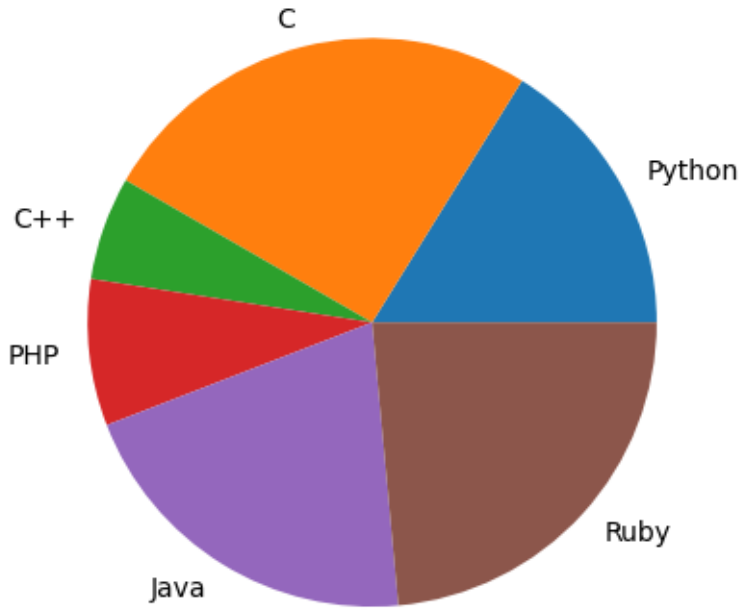
[13]:
```
years=[1950,1955,1960,1965,1970,1980,1985,1990,1995,2000,2005,2010,2015]
pops=[2.5,2.7,3.0,3.3,3.6,4.0,4.4,4.8,5.3,5.7,6.1,6.5,7.3]
death=[1.2,1.1,1.2,2.1,2.0,2.3,1.8,1.9,2.6,1.6,2.4,2.4,4.0]
lines=plt.plot(years,pops,years,death)
plt.grid(True)
plt.setp(lines,color=(1,.4,.5),marker='*')
plt.show()
```



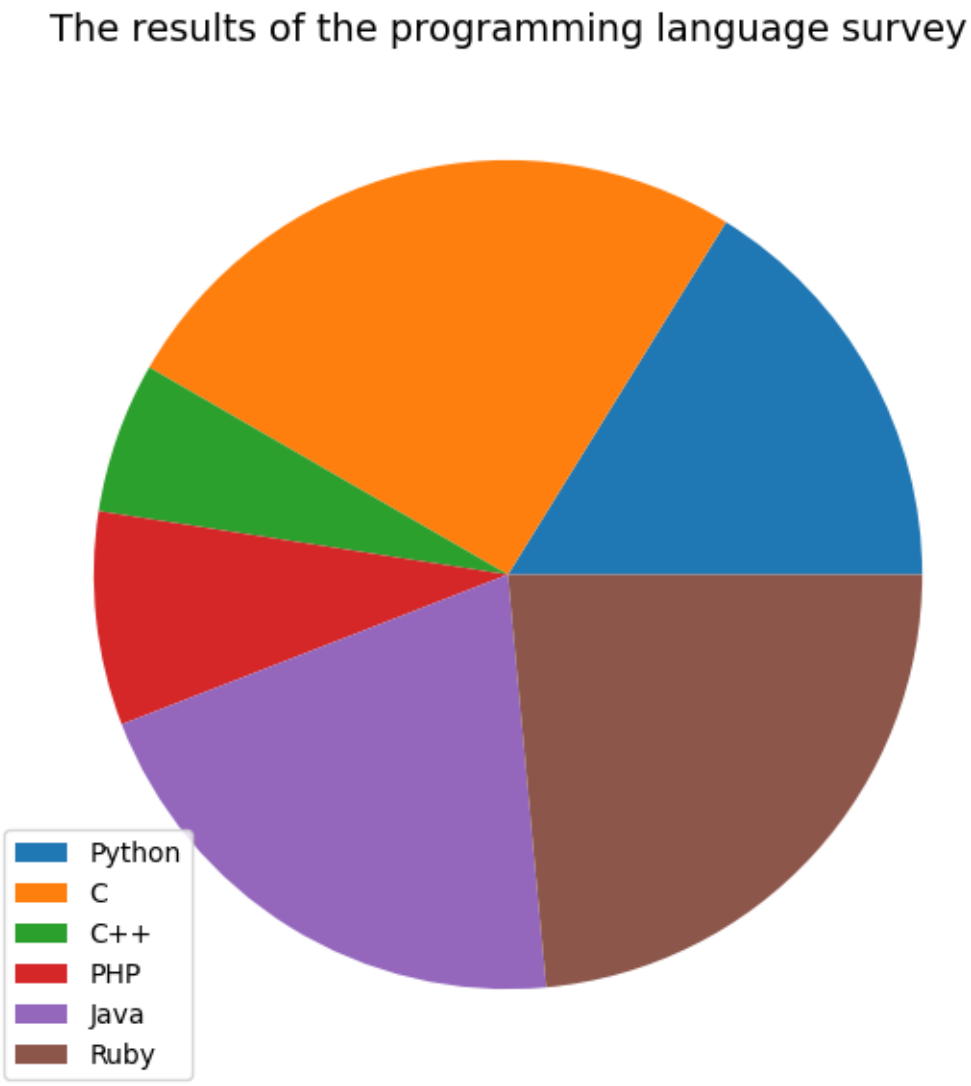
[14]:
```
data=[33,52,12,17,42,48]
plt.pie(data)
plt.show()
```



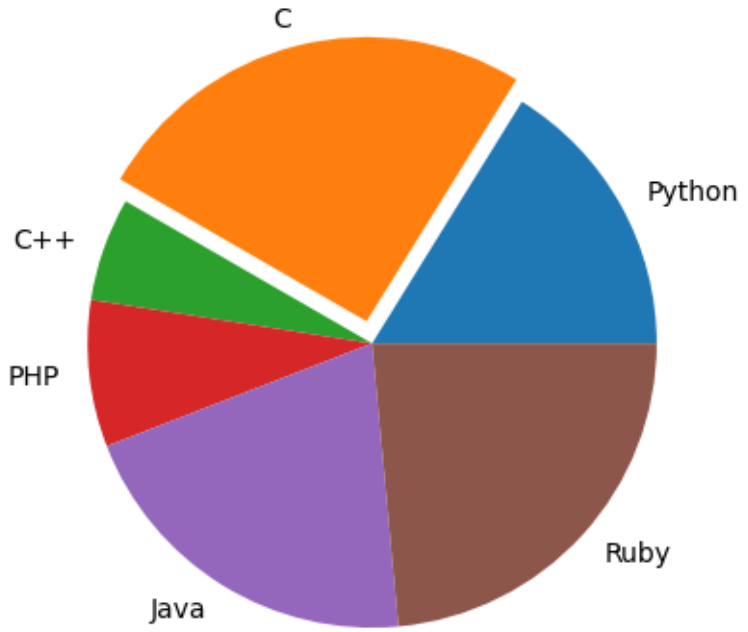
[15]:
```
labels=['Python','C','C++','PHP','Java','Ruby']
plt.pie(data,labels=labels)
plt.show()
```



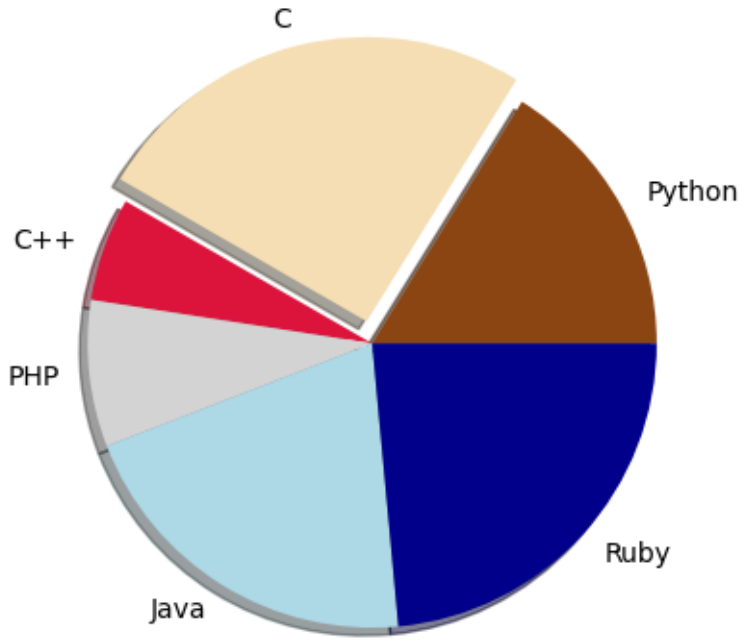
[16]:
```
plt.figure(figsize=(9, 7))
plt.pie(data)
plt.title('The results of the programming language survey', fontsize=14)
plt.legend(labels)
plt.show()
```



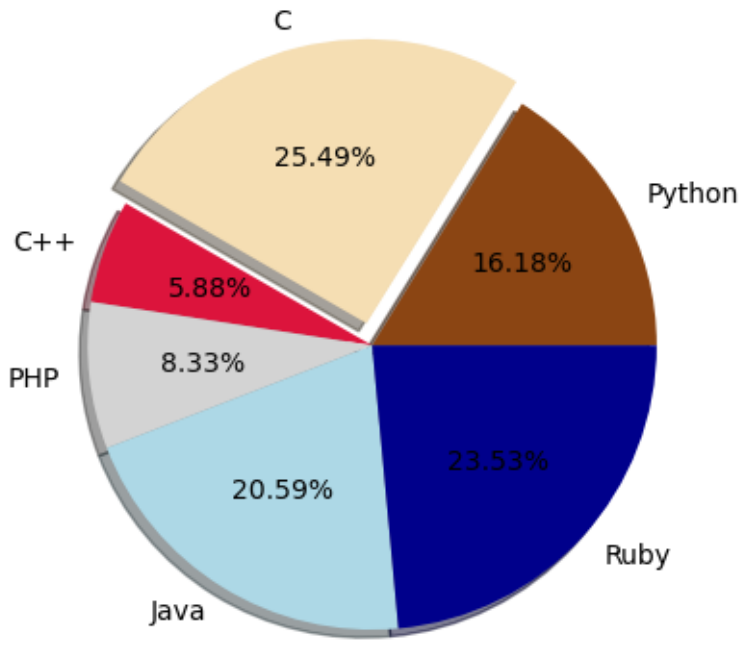
[17]:
```
explode = [0.0, 0.08, 0.0, 0.0,0.0,0.0]
plt.pie(data, explode=explode, labels=labels)
plt.show()
```



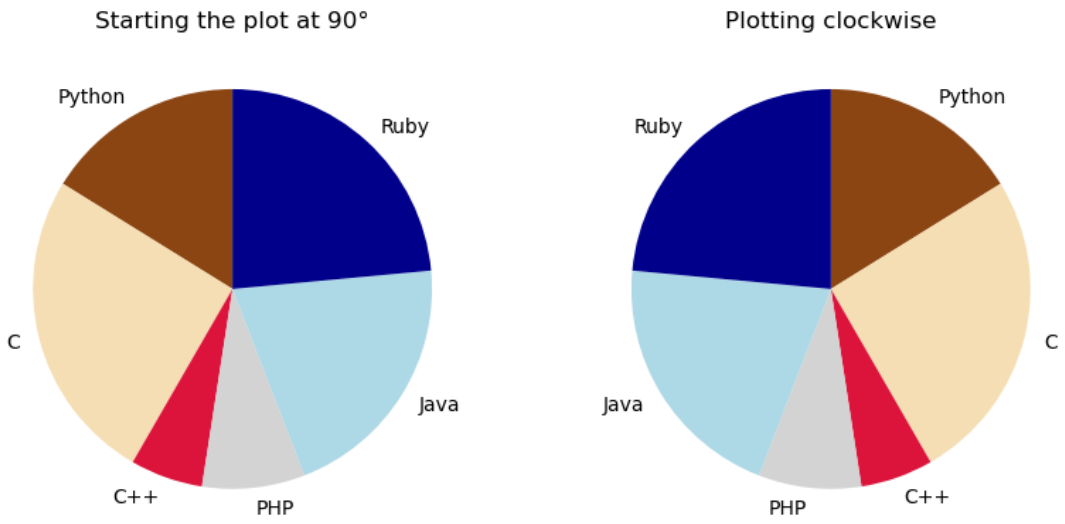
[18]:
```
colors = ['saddlebrown', 'wheat', 'crimson', 'lightgrey','lightblue','darkblue']
plt.pie(data,
        explode=explode,
        labels=labels,
        colors=colors,
        shadow=True)
plt.show()
```



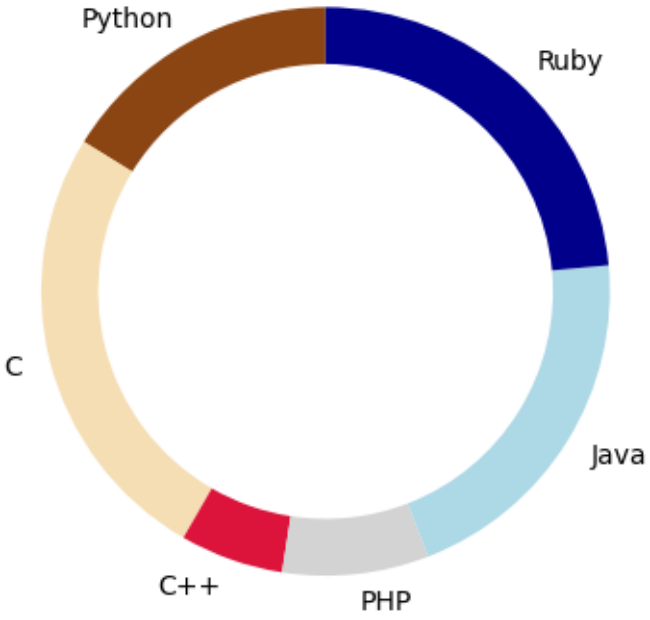
[19]:
```
plt.pie(data,
        explode=explode,
        labels=labels,
        colors=colors,
        autopct='%.2f%%',    # here we also add the % sign
        shadow=True)
plt.show()
```



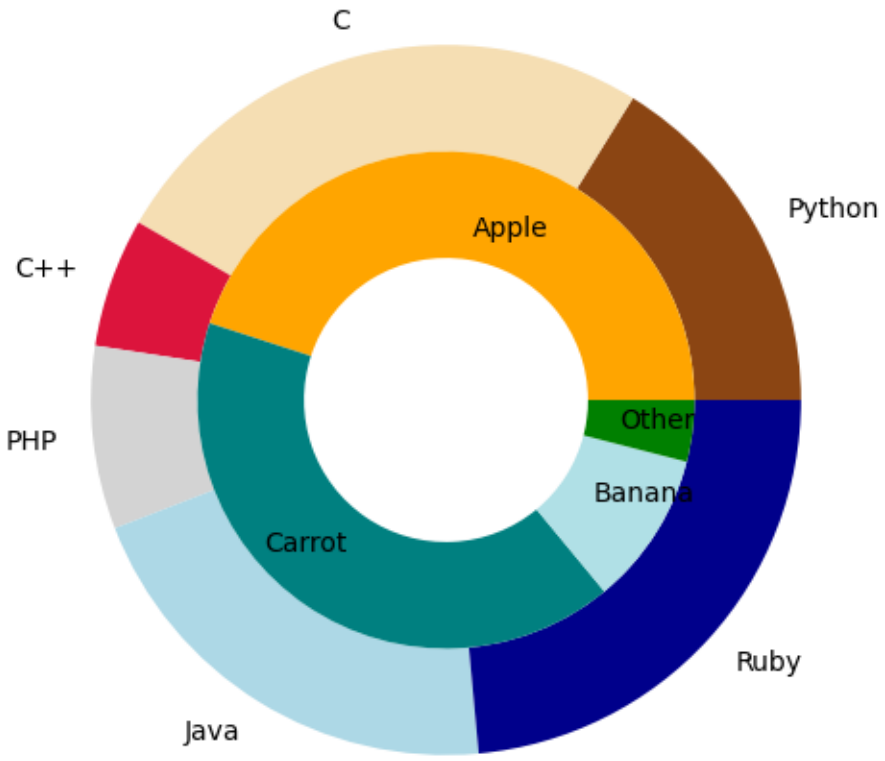
[20]:
```
fig, axes = plt.subplots(1, 2, figsize=(10, 6))
ax1, ax2 = axes

ax1.pie(data, labels=labels, colors=colors, startangle=90)
ax2.pie(data, labels=labels, colors=colors, startangle=90, counterclock=False)
ax1.set_title('Starting the plot at 90°')
ax2.set_title('Plotting clockwise')
plt.show()
```



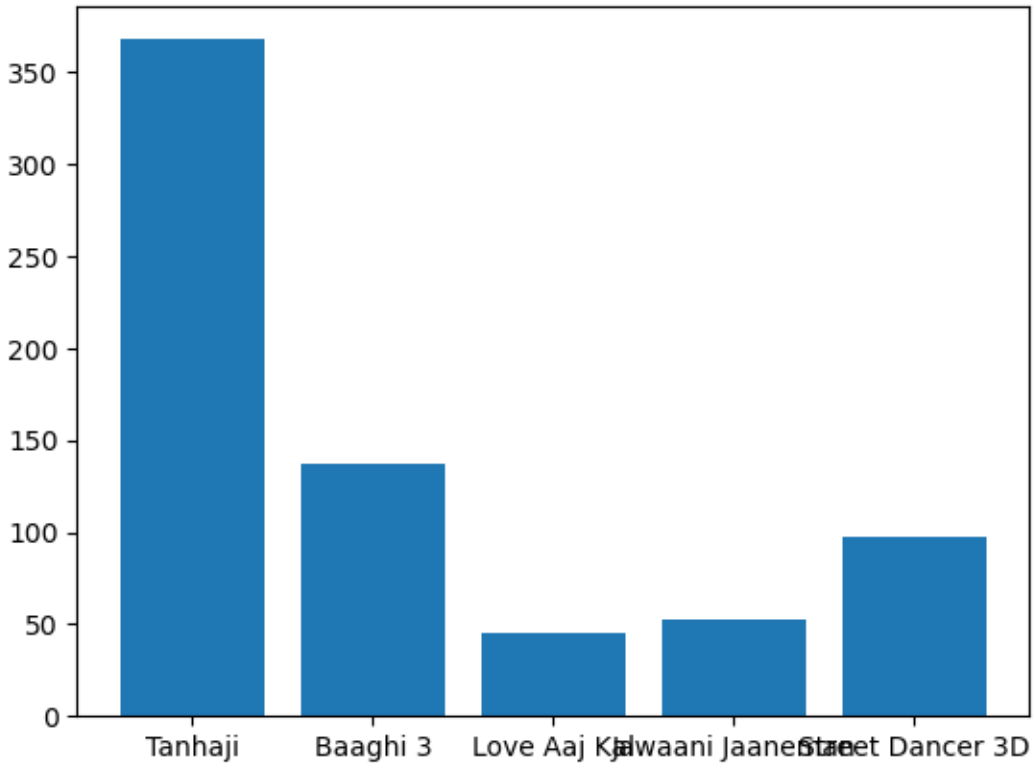
[21]:
```
plt.pie(data,
        labels=labels,
        colors=colors,
        startangle=90,
        wedgeprops={'width': 0.2})
plt.show()
```



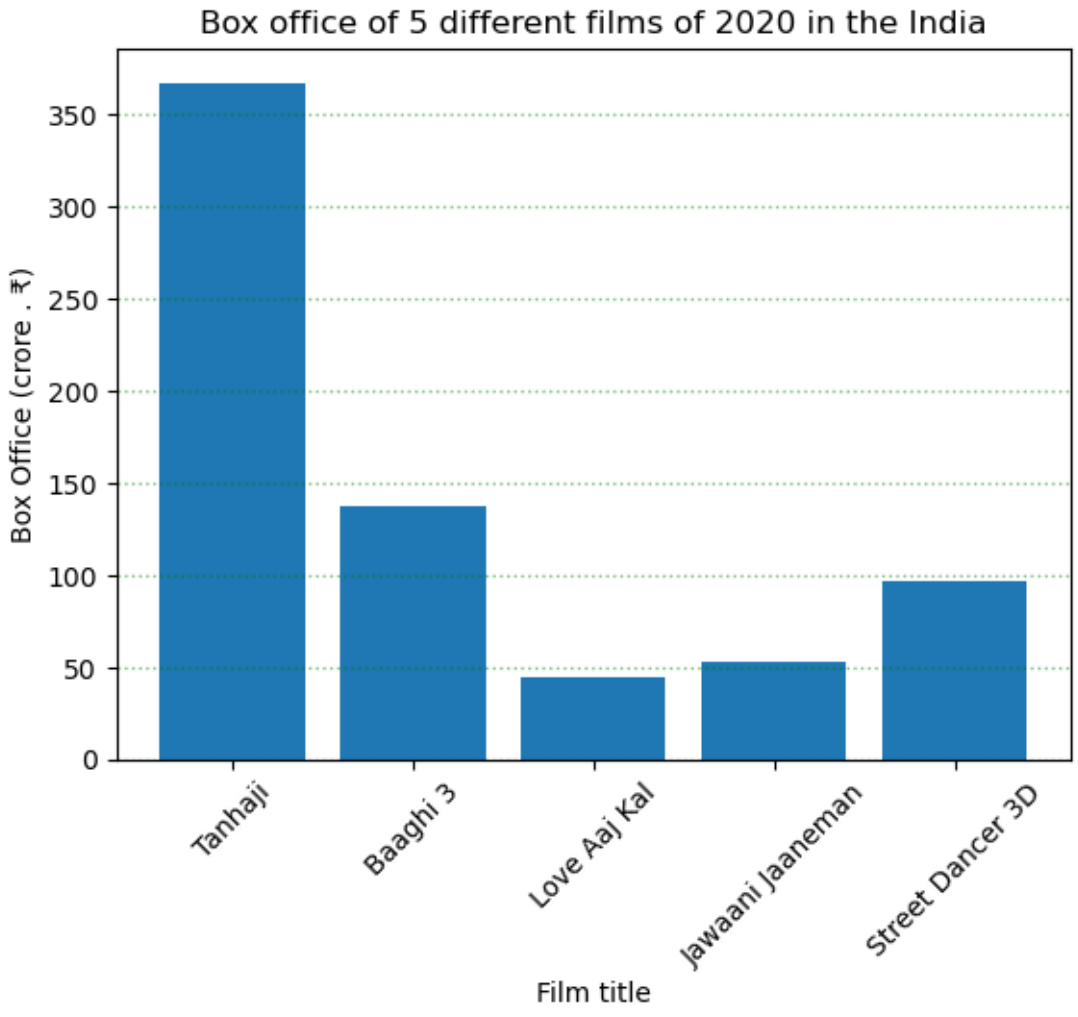
[23]:
```
fig, ax = plt.subplots(figsize=(8, 6))
width = 0.3

p_pie = ax.pie(data,radius=1,labels=labels, colors=colors,wedgeprops = {'width':
 ↪ width})

pets_data = [45, 41, 10, 4]
pets_labels = ['Apple', 'Carrot', 'Banana', 'Other']
pets_colors = ['orange', 'teal', 'powderblue', 'green']
pets_pie = ax.pie(pets_data,
                  radius=1-width,
                  labels=pets_labels,
                  labeldistance=0.7,
                  colors=pets_colors,
                  wedgeprops = {'width': width})

plt.show()
```



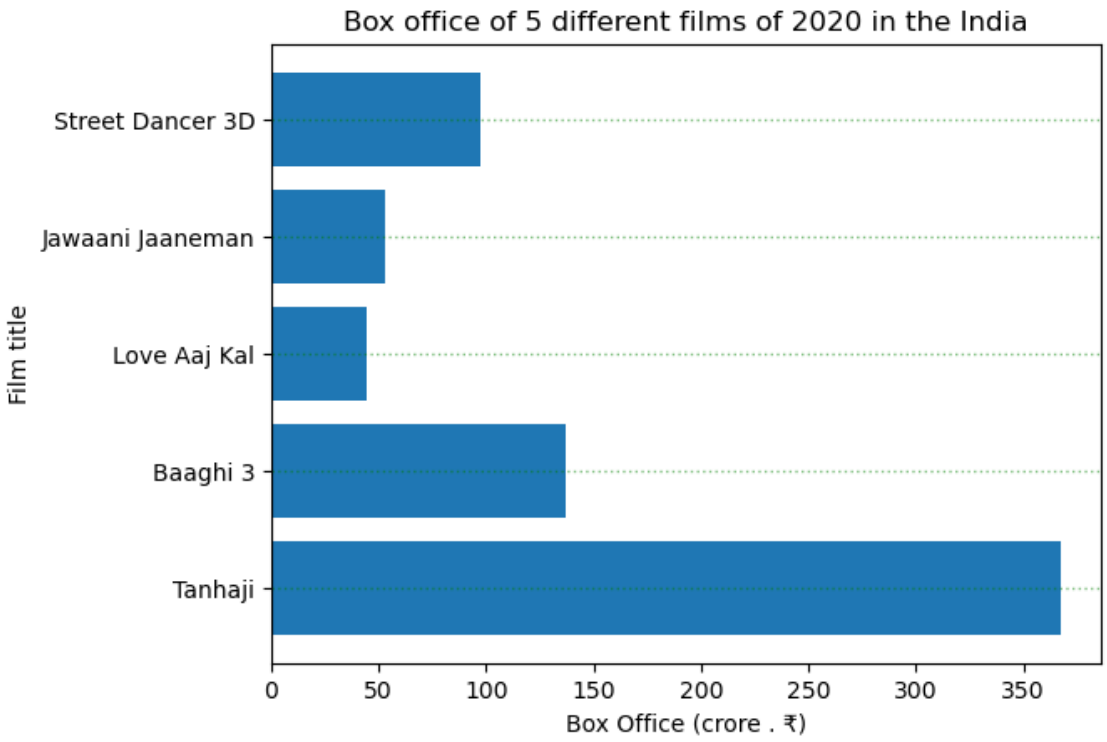
[26]:
```
films = ['Tanhaji', 'Baaghi 3', 'Love Aaj Kal', 'Jawaani Jaaneman', 'Street␣
↪Dancer 3D']
box_office = [367.65, 137.05, 44.77, 52.63, 97]
plt.bar(films, box_office)
plt.show()
```



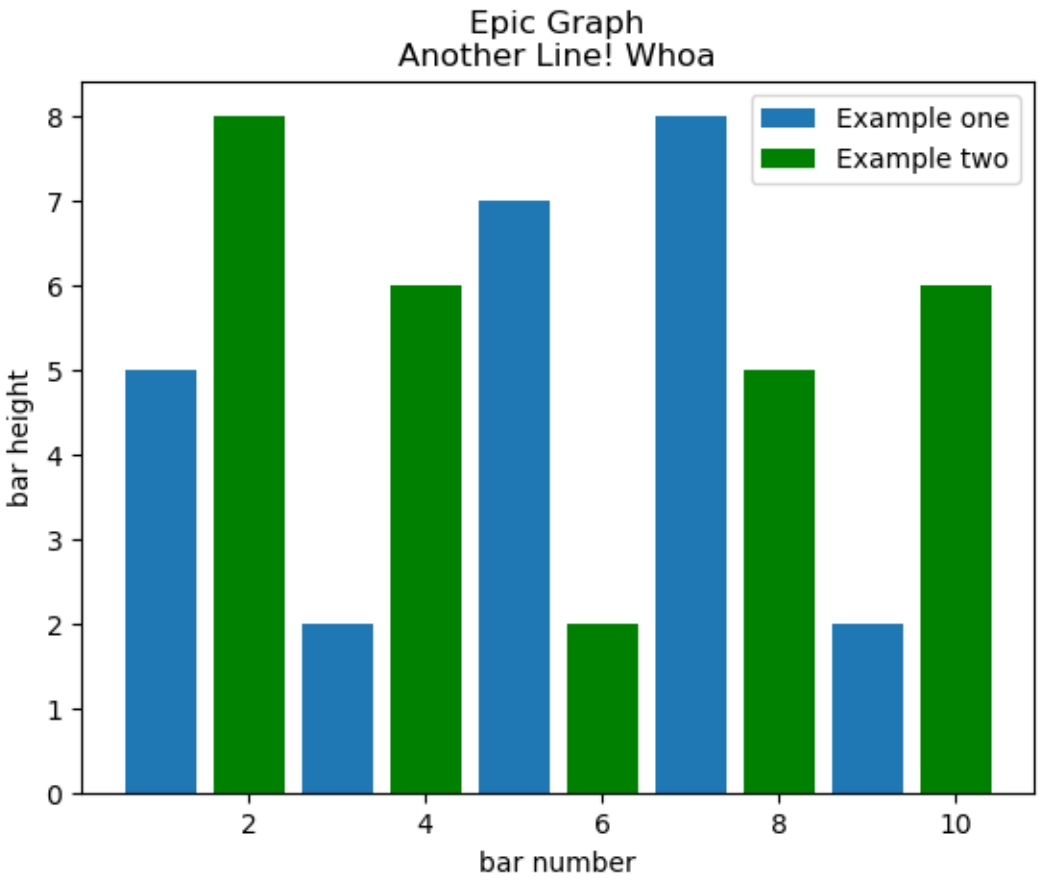
[30]:
```
plt.bar(films, box_office)

# add grid lines
plt.grid(color='green', linestyle=':', linewidth=1.0, axis='y', alpha=0.5)

plt.ylabel('Box Office (crore . )')  # labling y-axis
plt.xlabel('Film title')             # labling x-axis
plt.title('Box office of 5 different films of 2020 in the India')
plt.xticks(rotation = 45)
plt.show()
```



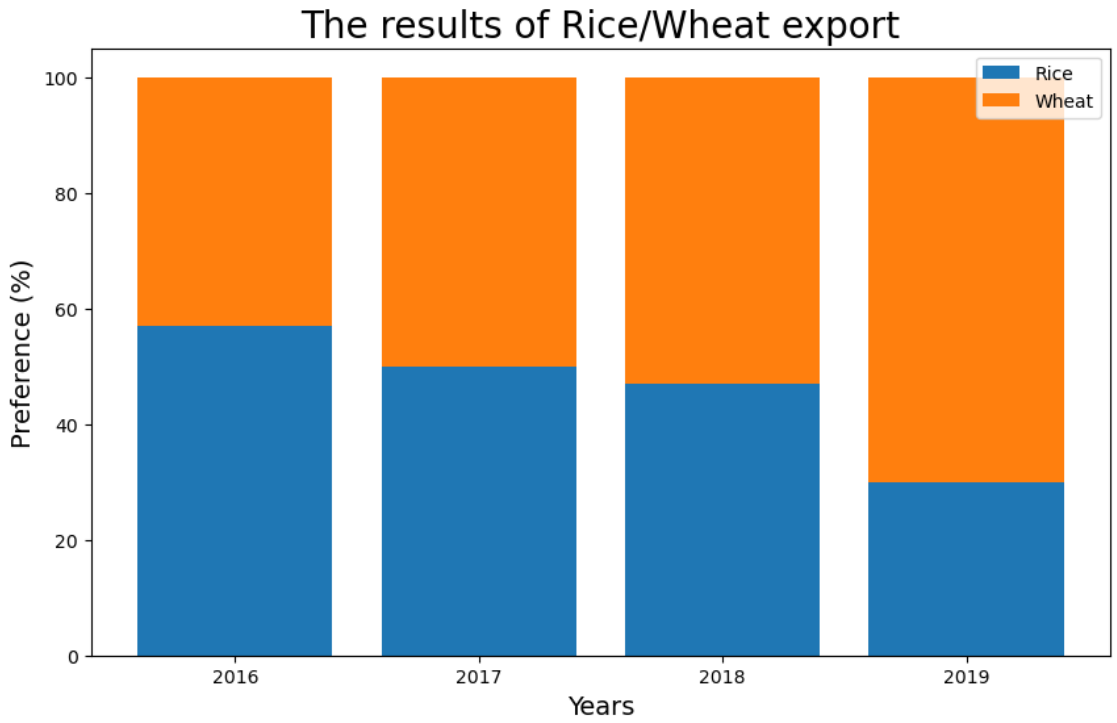
[33]:
```
plt.barh(films, box_office)

# add grid lines
plt.grid(color='green', linestyle=':', linewidth=1.0, axis='y', alpha=0.5)

plt.xlabel('Box Office (crore .  )')  # labling y-axis
plt.ylabel('Film title')            # labling x-axis
plt.title('Box office of 5 different films of 2020 in the India')
#plt.xticks(rotation = 45)
plt.show()
```



[31]:
```
plt.bar([1,3,5,7,9],[5,2,7,8,2], label="Example one")
plt.bar([2,4,6,8,10],[8,6,2,5,6], label="Example two", color='g')
plt.legend()
plt.xlabel('bar number')
plt.ylabel('bar height')

plt.title('Epic Graph\nAnother Line! Whoa')

plt.show()
```

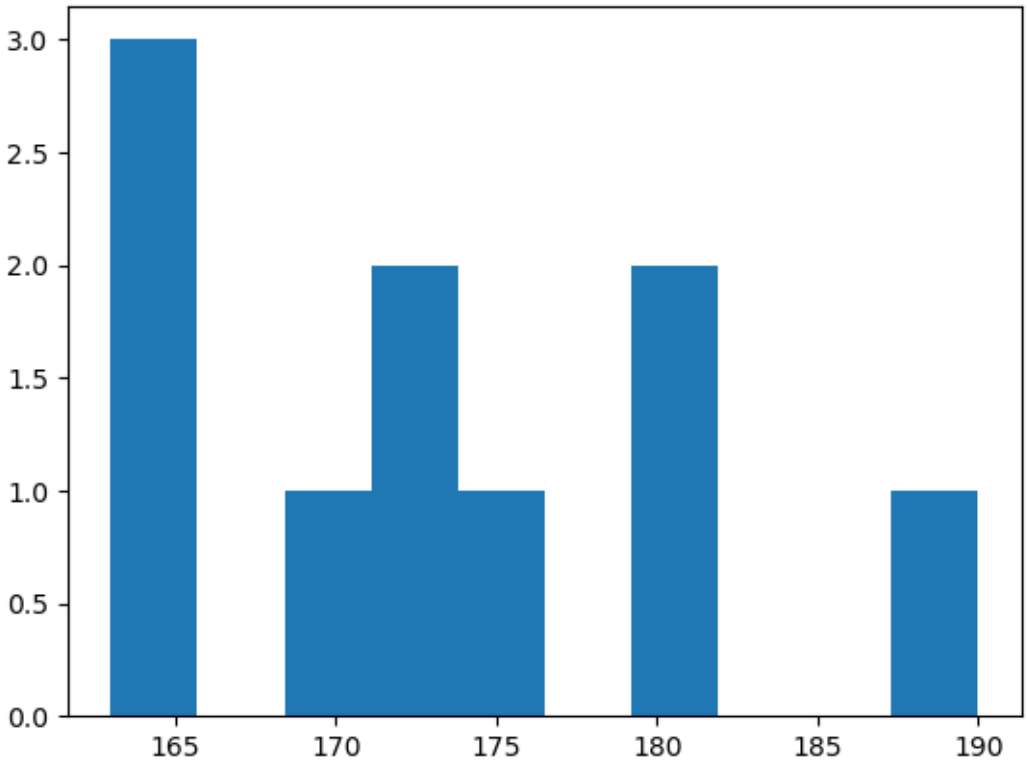


[34]:
```
years = ['2016', '2017', '2018', '2019']
rice = [57, 50, 47, 30]
wheat = [43, 50, 53, 70]

plt.figure(figsize=(10, 6))

plt.bar(years, rice, label='Rice')
plt.bar(years, wheat, bottom=rice, label='Wheat')

plt.xlabel('Years', fontsize=14)
plt.ylabel('Preference (%)', fontsize=14)
plt.title('The results of Rice/Wheat export', fontsize=20)
plt.legend()
plt.show()
```

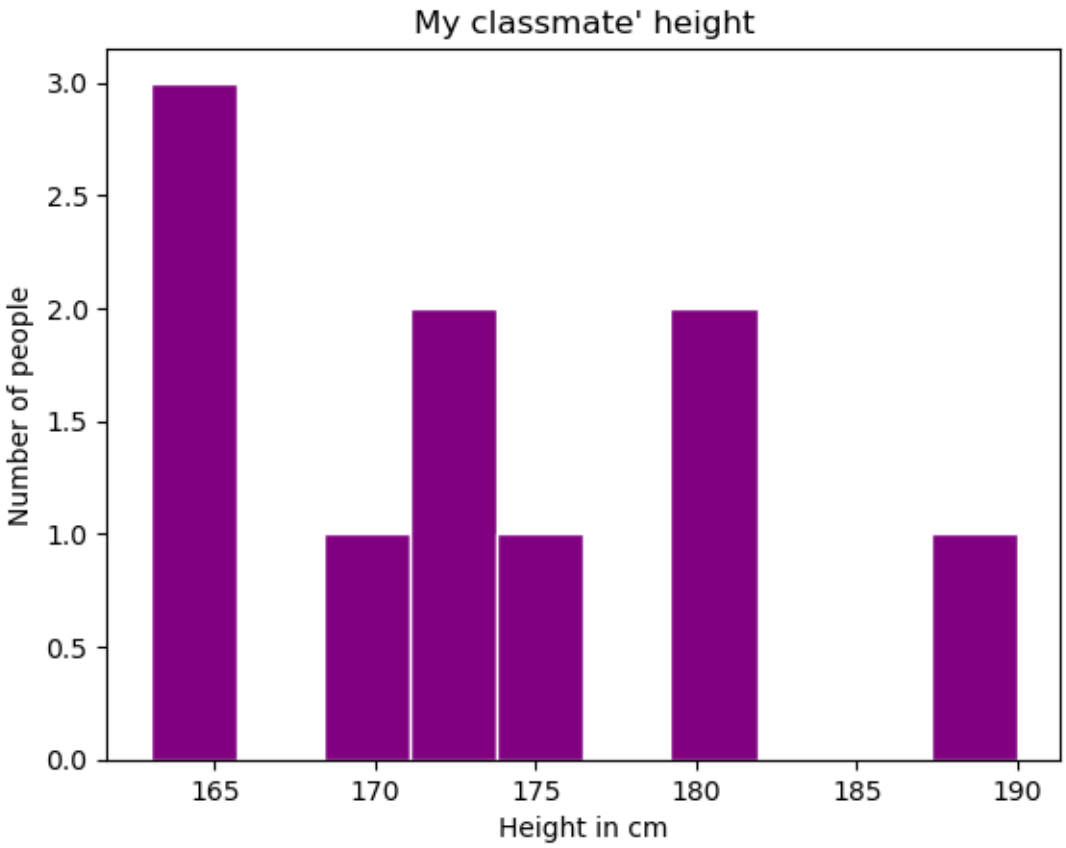


[35]:
```
data = [163, 163, 164, 170, 180, 172, 173, 190,175,180]
plt.hist(data)
```

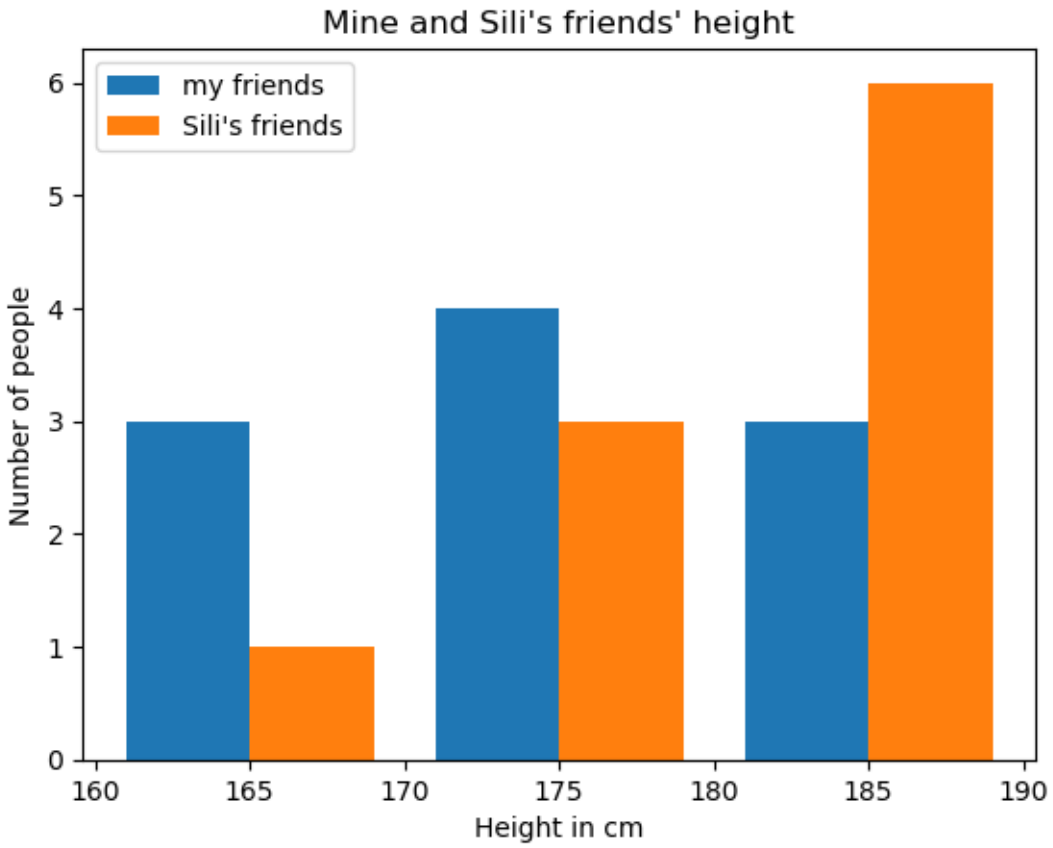
[35]:
```
(array([3., 0., 1., 2., 1., 0., 2., 0., 0., 1.]),
 array([163. , 165.7, 168.4, 171.1, 173.8, 176.5, 179.2, 181.9, 184.6,
        187.3, 190. ]),
 <BarContainer object of 10 artists>)
```



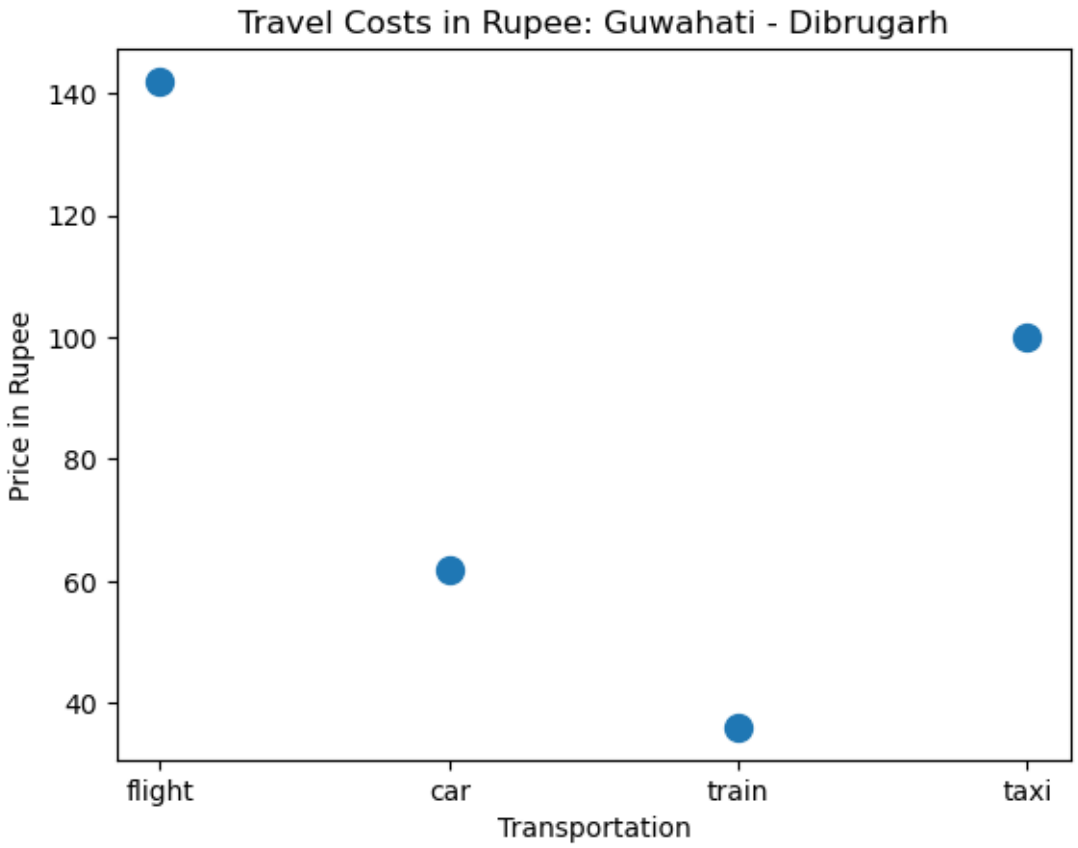
[36]:
```
plt.hist(data, color="purple", edgecolor="white")
plt.title("My classmate' height")
plt.ylabel("Number of people")
plt.xlabel("Height in cm")
plt.show()
```



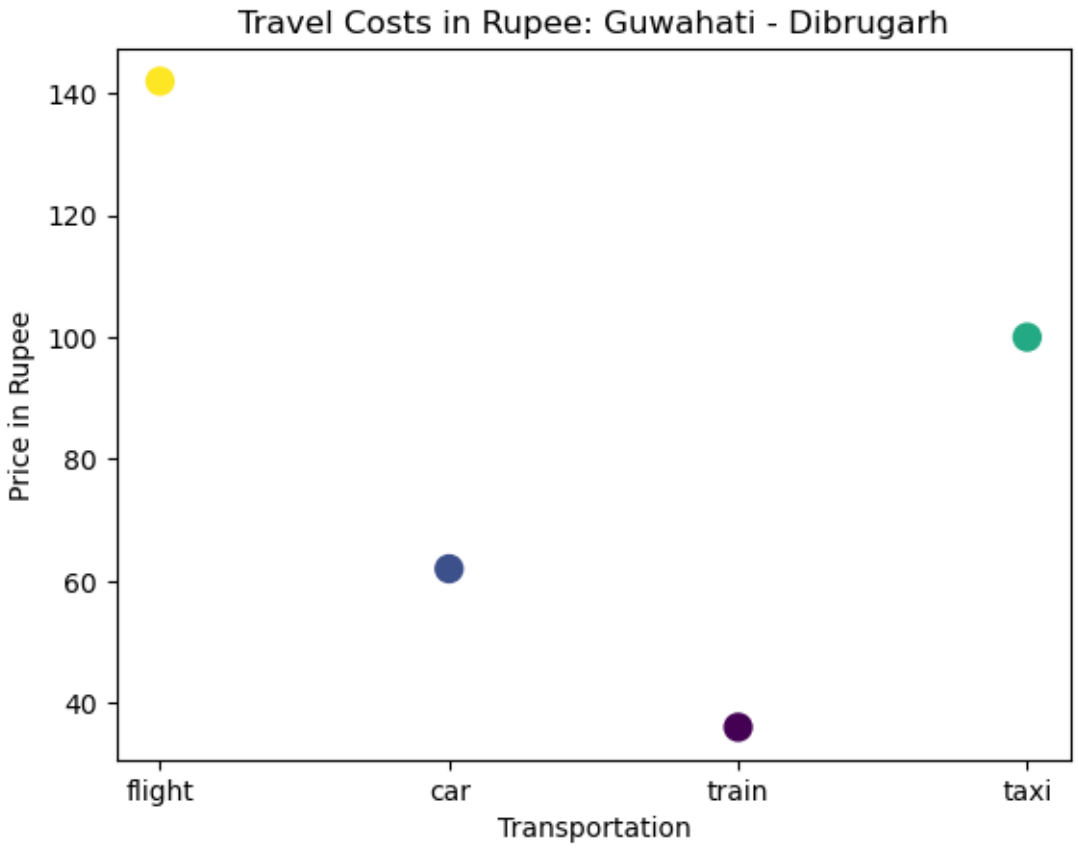
[37]:
```
my_data = [163, 163, 164, 170, 170, 172, 173, 190,190,180]
sili_data = [161, 172, 174, 175, 181, 183, 186, 190,180,185]
bins = [160, 170, 180, 190]
names = ["my friends", "Sili's friends"]

plt.hist([my_data, sili_data], bins=bins, label=names)
plt.title("Mine and Sili's friends' height")
plt.ylabel("Number of people")
plt.xlabel("Height in cm")

plt.legend()
plt.show()
```



[38]:
```
travel = ['flight', 'car', 'train', 'taxi']
price = [142, 62, 36, 100]
plt.title("Travel Costs in Rupee: Guwahati - Dibrugarh")
plt.xlabel("Transportation")
plt.ylabel("Price in Rupee")
plt.scatter(travel, price, s=100)
plt.show()
```

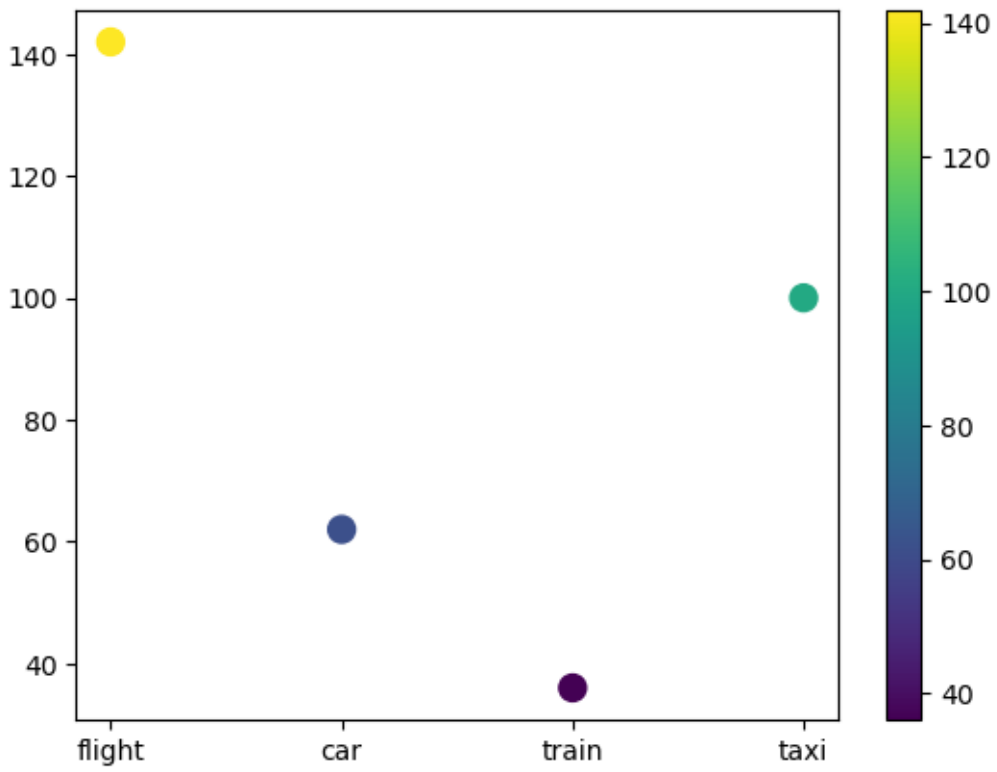


[39]:
```
travel = ['flight', 'car', 'train', 'taxi']
price = [142, 62, 36, 100]
plt.title("Travel Costs in Rupee: Guwahati - Dibrugarh")
plt.xlabel("Transportation")
plt.ylabel("Price in Rupee")
plt.scatter(travel, price,c=price, s=100)
plt.show()
```

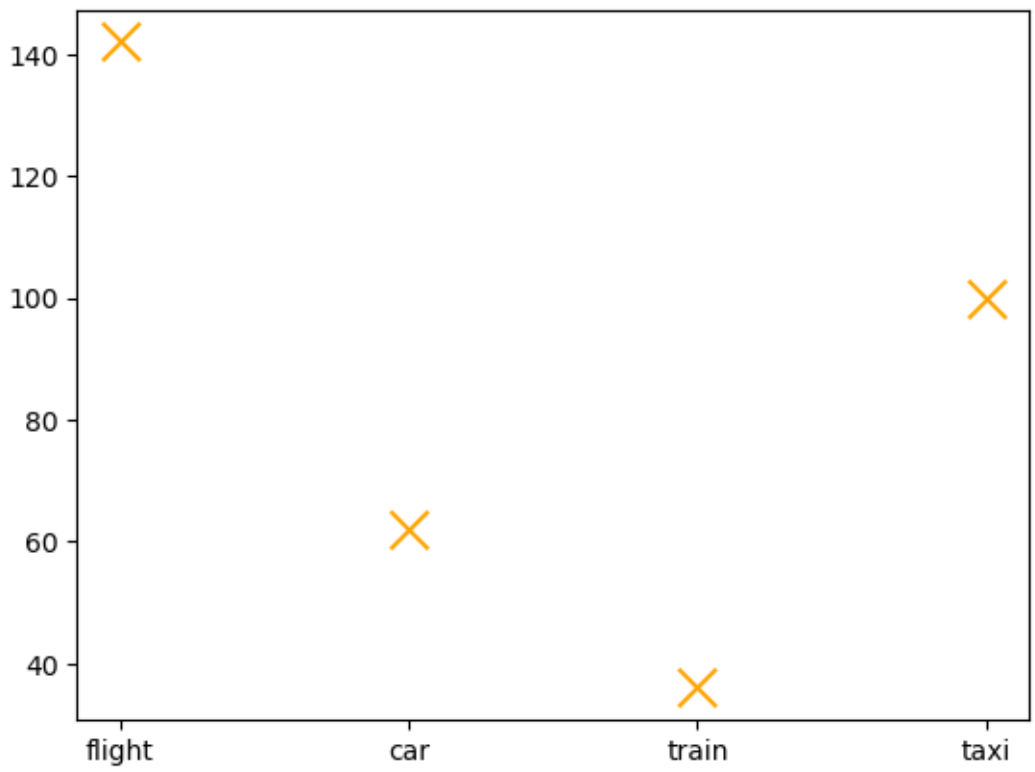


[40]:
```
plt.scatter(travel, price, c=price, cmap='viridis', s=100)
plt.colorbar()
```

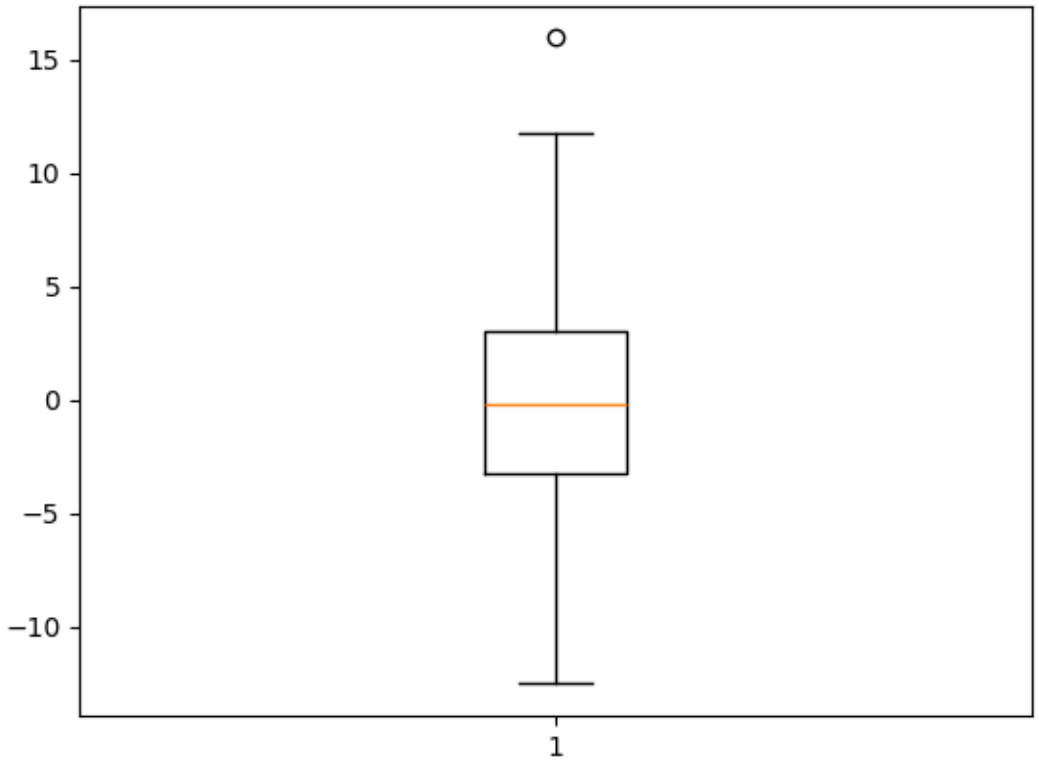
[40]: <matplotlib.colorbar.Colorbar at 0x257188c5a10>



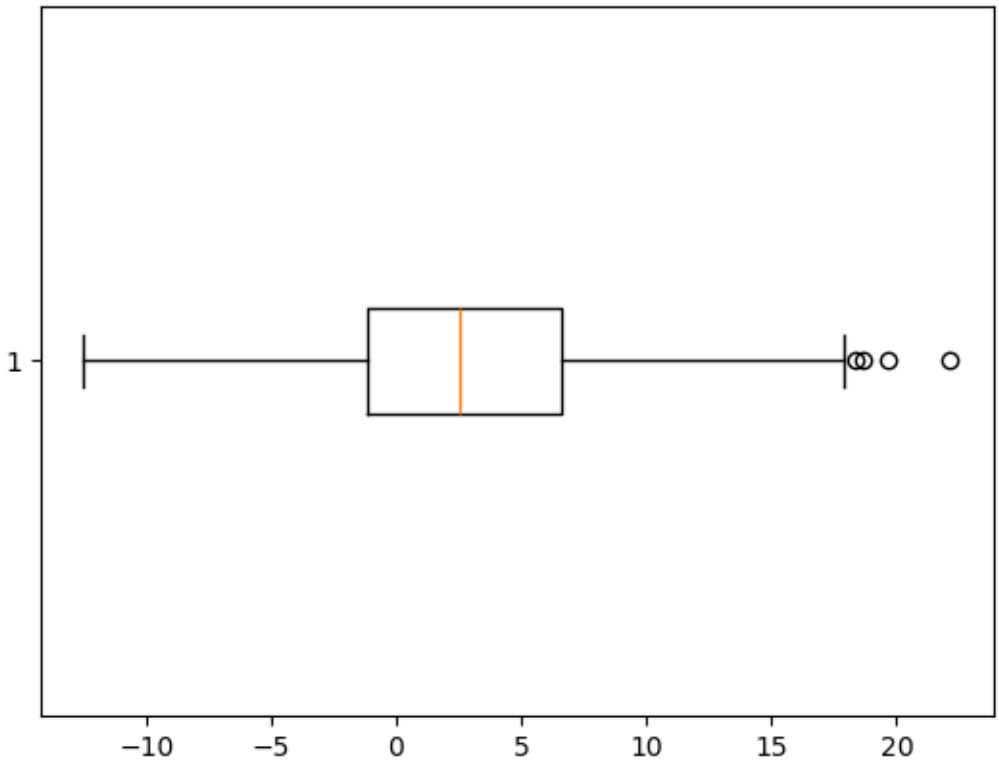
[41]:
```
plt.scatter(travel, price, c='orange', marker='x', s=200)
plt.show()
```



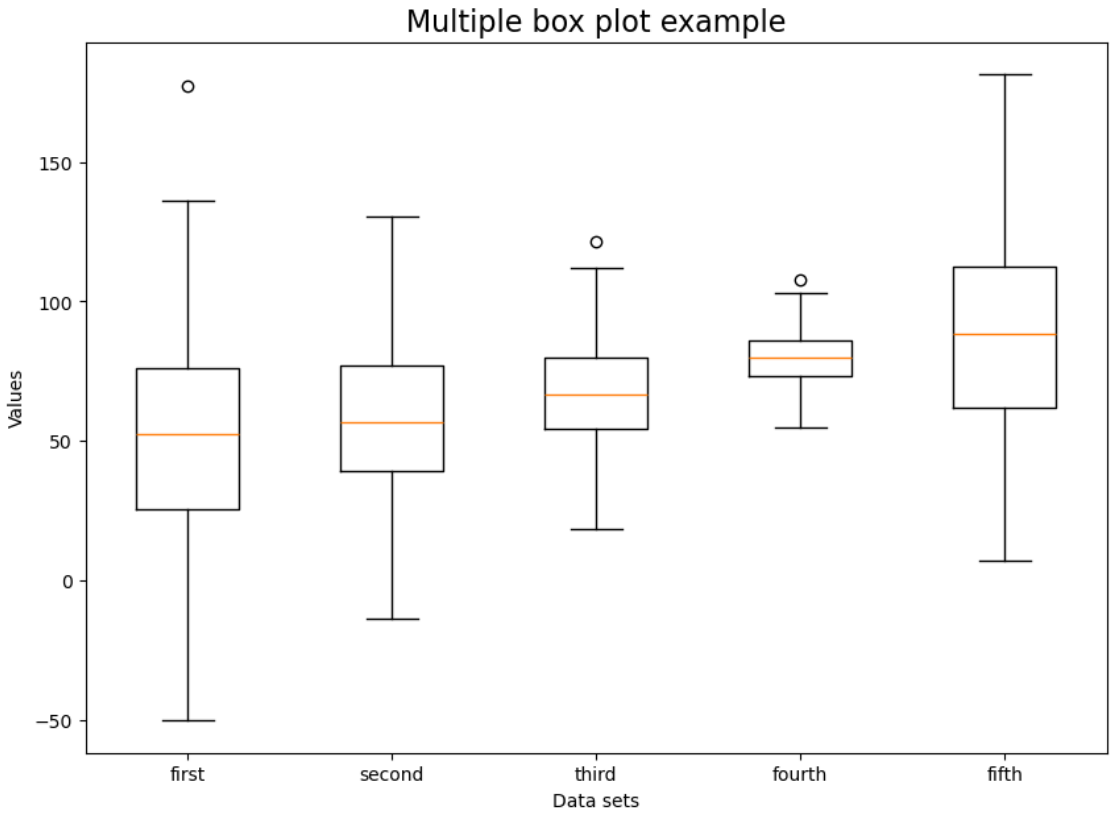
[42]:
```
# set the numpy seed for results reproducibility
np.random.seed(23)
# generate data
data = np.random.normal(0, 5, size=400)
# create a boxplot
plt.boxplot(data)
plt.show()
```



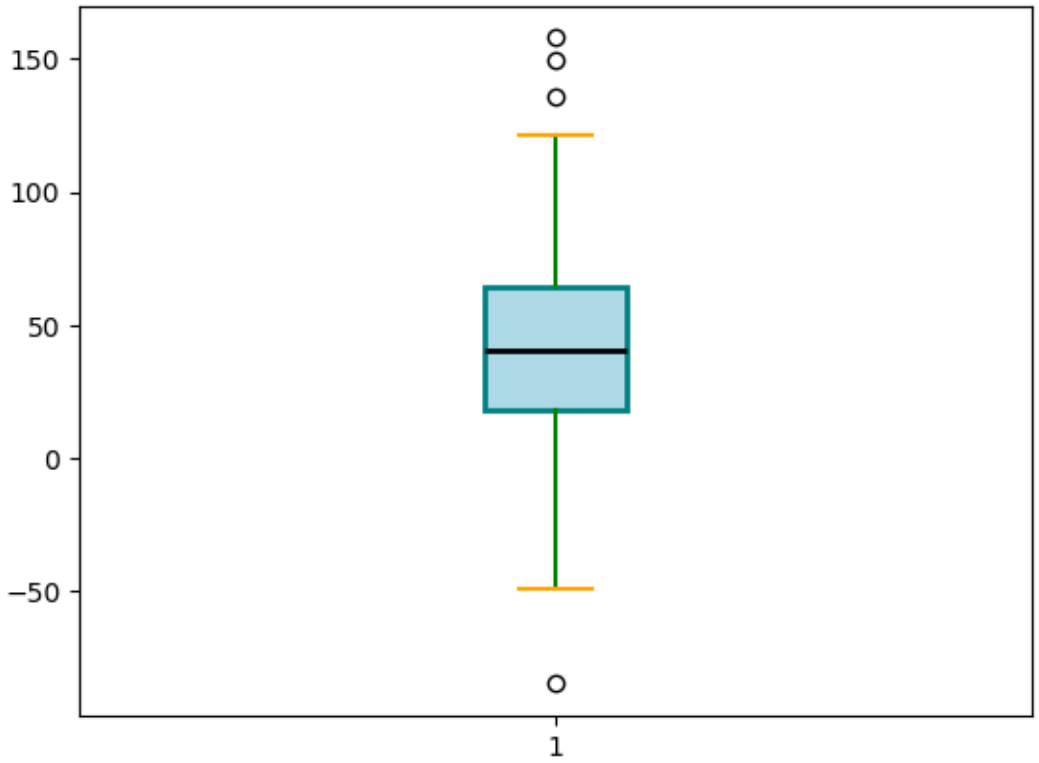
[43]:
```
np.random.seed(23)
data = np.random.normal(3, 6, size=1000)
plt.boxplot(data, vert=False)
plt.show()
```



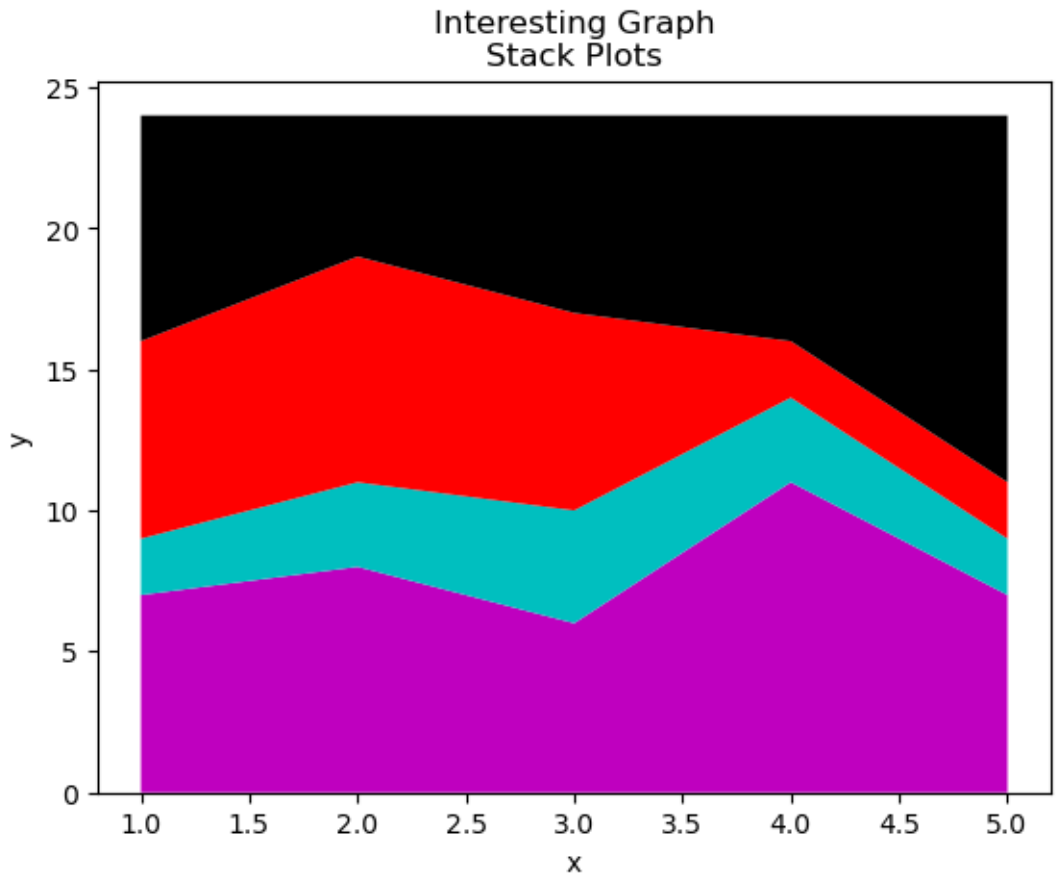
[45]:
```
np.random.seed(23)

data_1 = np.random.normal(50, 40, 200)
data_2 = np.random.normal(60, 30, 200)
data_3 = np.random.normal(70, 20, 200)
data_4 = np.random.normal(80, 10, 200)
data_5 = np.random.normal(90, 35, 200)

data = [data_1, data_2, data_3, data_4, data_5]
plt.figure(figsize =(10, 7))

labels = ['first', 'second', 'third', 'fourth','fifth']
plt.boxplot(data, labels=labels)

plt.ylabel('Values')
plt.xlabel('Data sets')
plt.title('Multiple box plot example', fontsize=16)

plt.show()
```



[47]:
```
boxprops = {'facecolor': 'lightblue', 'edgecolor': 'teal', 'linewidth': 2.0}
whiskerprops = {'color': 'green', 'linewidth': 1.5}
capprops = {'color': 'orange', 'linewidth': 1.5}
medianprops = {'color': 'black', 'linewidth': 2}

np.random.seed(14)
data = np.random.normal(50, 40, size=200)

plt.boxplot(data,
            patch_artist=True,
            boxprops=boxprops,
            whiskerprops=whiskerprops,
            capprops=capprops,
            medianprops=medianprops)

plt.show()
```

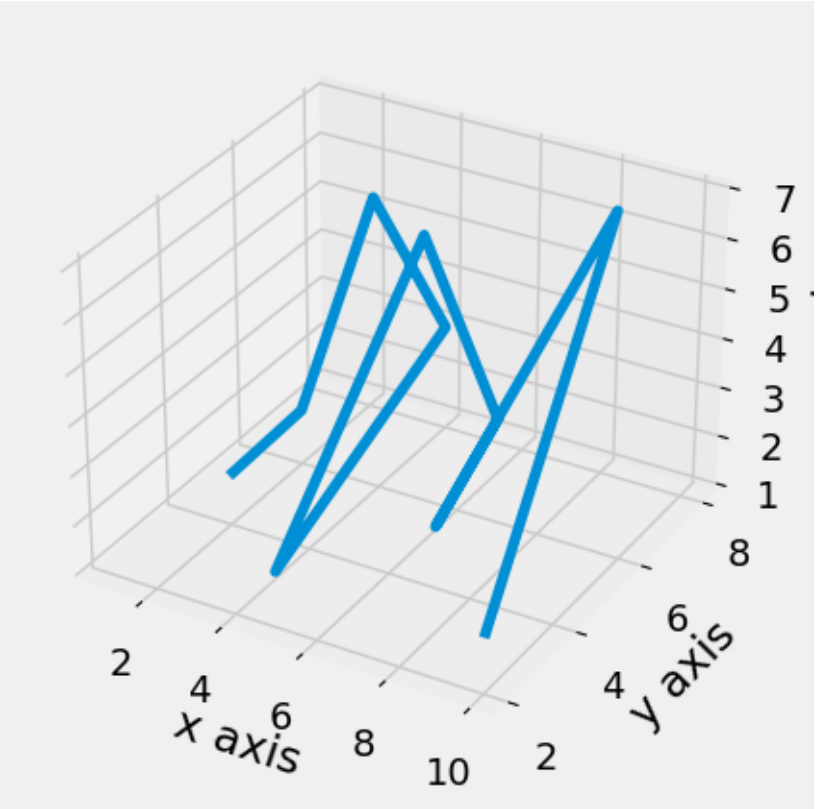


[48]:
```
days = [1,2,3,4,5]

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','k'])

plt.xlabel('x')
plt.ylabel('y')
plt.title('Interesting Graph\nStack Plots')
plt.show()
```



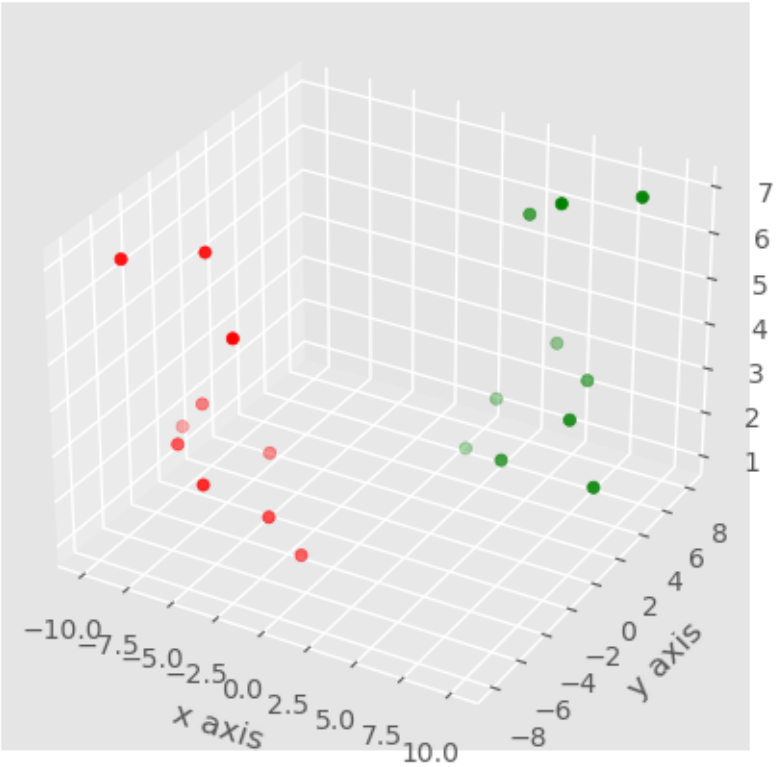
[49]:
```
from mpl_toolkits.mplot3d import axes3d
import matplotlib.pyplot as plt
from matplotlib import style

style.use('fivethirtyeight')

fig = plt.figure()
ax1 = fig.add_subplot(111, projection='3d')

x = [1,2,3,4,5,6,7,8,9,10]
y = [5,6,7,8,2,5,6,3,7,2]
z = [1,2,6,3,2,7,3,3,7,2]

ax1.plot(x,y,z)

ax1.set_xlabel('x axis')
ax1.set_ylabel('y axis')
ax1.set_zlabel('z axis')
```

```
plt.show()
```



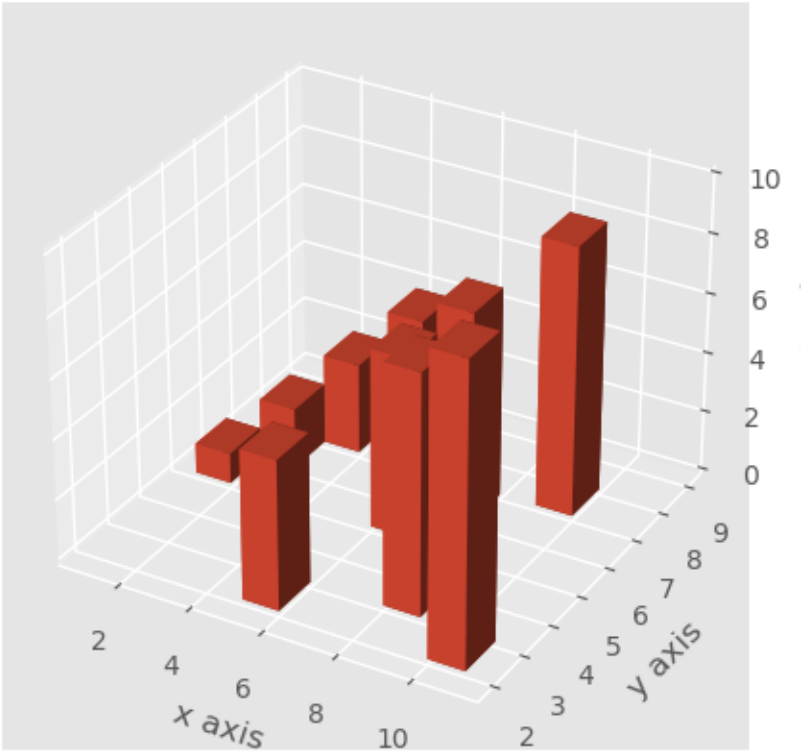
[50]:
```
from mpl_toolkits.mplot3d import axes3d
import matplotlib.pyplot as plt
from matplotlib import style

style.use('ggplot')

fig = plt.figure()
ax1 = fig.add_subplot(111, projection='3d')

x = [1,2,3,4,5,6,7,8,9,10]
y = [5,6,7,8,2,5,6,3,7,2]
z = [1,2,6,3,2,7,3,3,7,2]

x2 = [-1,-2,-3,-4,-5,-6,-7,-8,-9,-10]
y2 = [-5,-6,-7,-8,-2,-5,-6,-3,-7,-2]
z2 = [1,2,6,3,2,7,3,3,7,2]

ax1.scatter(x, y, z, c='g', marker='o')
ax1.scatter(x2, y2, z2, c ='r', marker='o')
```

```
ax1.set_xlabel('x axis')
ax1.set_ylabel('y axis')
ax1.set_zlabel('z axis')

plt.show()
```

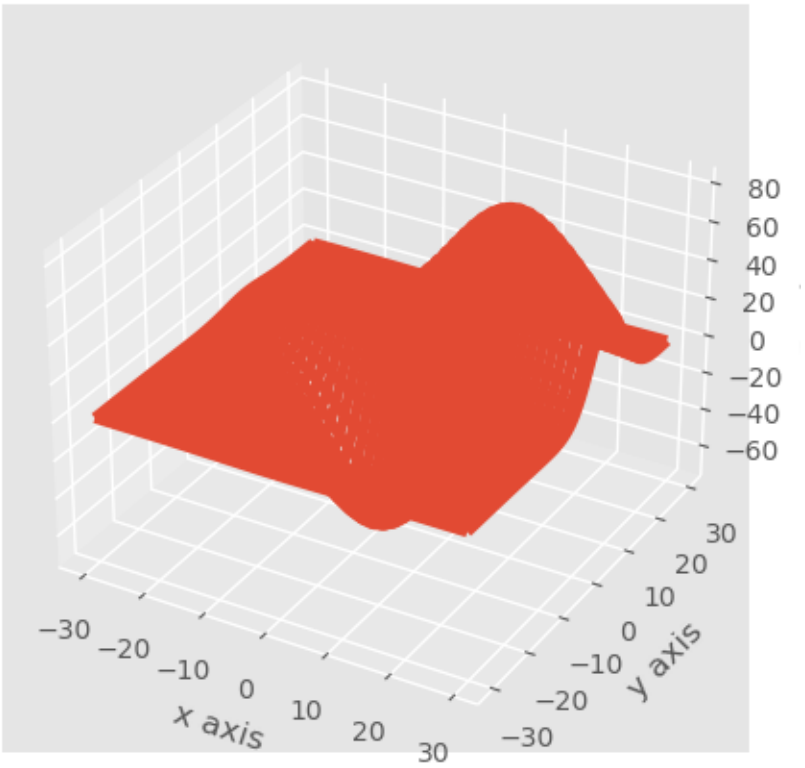


[51]:
```
fig = plt.figure()
ax1 = fig.add_subplot(111, projection='3d')

x3 = [1,2,3,4,5,6,7,8,9,10]
y3 = [5,6,7,8,2,5,6,3,7,2]
z3 = np.zeros(10)

dx = np.ones(10)
dy = np.ones(10)
dz = [1,2,3,4,5,6,7,8,9,10]

ax1.bar3d(x3, y3, z3, dx, dy, dz)
```

```
ax1.set_xlabel('x axis')
ax1.set_ylabel('y axis')
ax1.set_zlabel('z axis')

plt.show()
```



[52]:
```
fig = plt.figure()
ax1 = fig.add_subplot(111, projection='3d')

x, y, z = axes3d.get_test_data()

ax1.plot_wireframe(x,y,z, rstride = 3, cstride = 3)

ax1.set_xlabel('x axis')
ax1.set_ylabel('y axis')
ax1.set_zlabel('z axis')

plt.show()
```


80
60
40
20
0
−20
−40
−60
−30
−20
−10
0
10
20
30
x axis
30
20
10
0
−10
−20
−30
y axis

[ ]: