10_Matplotlib

August 29, 2022

1 Mastering Matplotlib!

[1]:
```
import matplotlib.pyplot as plt
```

1.1 Line Plots

[ ]:
```
plt.plot()
```

[ ]:
```
plt.plot([2,4,6,8])
```

[ ]:
```
plt.plot([2,4,2,6,8,4])
```

[ ]:
```
salaries=[55000,65000,72000,90000,115000,150000]
ages = [20,25,30,32,40,45]
plt.plot(ages, salaries)
```

[ ]:
```
plt.plot(ages, salaries)
```

[ ]:
```
import numpy as np
nums = np.arange(5)
```

[ ]:
```
plt.plot(nums,nums)
plt.plot(nums, nums*nums)
plt.plot(nums, nums**3)
```

[ ]:
```
plt.figure()
plt.plot(nums,nums)
plt.figure()
plt.plot(nums, nums*nums)
plt.plot(nums, nums**3)
```

[ ]:
```
plt.figure()
plt.plot(nums,nums)
plt.figure()
plt.plot(nums, nums*nums)
plt.figure()
plt.plot(nums, nums**3)
```

[ ]:
```
import matplotlib.pyplot as plt
plt.figure(figsize=(2,6), dpi=200)
plt.plot(nums,nums)
```

[ ]:
```
plt.figure(figsize=(6,6), dpi=50)
plt.plot(nums,nums**3)
```

[ ]:
```
plt.style.available
```

[ ]:
```
plt.style.use('fivethirtyeight')
```

[ ]:
```
plt.plot(nums,nums)
plt.plot(nums, nums*nums)
plt.plot(nums, nums**3)
```

[ ]:
```
plt.style.use('dark_background')
```

[ ]:
```
plt.plot(nums,nums)
plt.plot(nums, nums*nums)
plt.plot(nums, nums**3)
```

[ ]:
```
plt.style.use('ggplot')
```

[ ]:
```
plt.plot(nums, nums)
plt.plot(nums, nums*nums)
plt.plot(nums, nums**3)
```

[ ]:
```
plt.plot(nums, nums, color="olive", linewidth=4)
plt.plot(nums, nums*nums, color="#ff6b6b", linewidth=4)
plt.plot(nums, nums**3, c="#ff9f43", linewidth=4)
```

[ ]:
```
plt.plot(nums, nums, color="olive", linewidth=4, linestyle="dashed")
plt.plot(nums, nums*nums, color="#ff6b6b", linewidth=4, linestyle="dotted")
plt.plot(nums, nums**3, c="#ff9f43", linewidth=4, linestyle="-.")
```

[ ]:
```
plt.plot(nums, nums, color="olive", marker="*", markersize=20,␣
↪markerfacecolor="#ff9f43")
```

[ ]:
```
salaries=[55000,65000,72000,90000,115000,150000]
ages = [20,25,30,32,40,45]
plt.plot(ages, salaries)
plt.title("Company Salaries")
plt.figure()
plt.plot(nums, nums, color="olive", linewidth=4, linestyle="dashed")
plt.title("Linear Stuff", loc="right")
#plt.show()
```

[ ]:
```
salaries=[55000,65000,72000,90000,115000,150000]
ages = [20,25,30,32,40,45]
plt.plot(ages, salaries)
plt.title("Company Salaries", fontsize=24, color="olive")
plt.xlabel("Employee Age", labelpad=5)
plt.ylabel("Average Salary", labelpad=15 )
```

[ ]:
```
plt.figure(figsize=(8,8))
salaries=[55000,65000,72000,90000,115000,150000]
ages = [20,25,30,32,40,45]
plt.plot(ages, salaries)
plt.title("Company Salaries", fontsize=24, color="olive")
plt.xlabel("Employee Age", labelpad=10)
plt.ylabel("Average Salary", labelpad=10 )
plt.xticks([20,25,30,35,40,45])
plt.yticks([60000,80000,100000, 120000, 140000], labels=["60k", "80k", "100k",␣
↪"120k","140k"])
```

[ ]:
```
plt.figure(figsize=(8,8))
salaries=[55000,65000,72000,90000,115000,150000]
ages = [20,25,30,32,40,45]
plt.plot(ages, salaries)
plt.xlim(25,40)
plt.ylim(80000, 120000)
```

[ ]:
```
plt.figure(figsize=(5,5))
plt.plot(nums, color="teal", label="x")
plt.plot(nums**2, color="olive", label="x squared")
plt.plot(nums**3, color="purple",label="x cubed")
plt.legend()
```

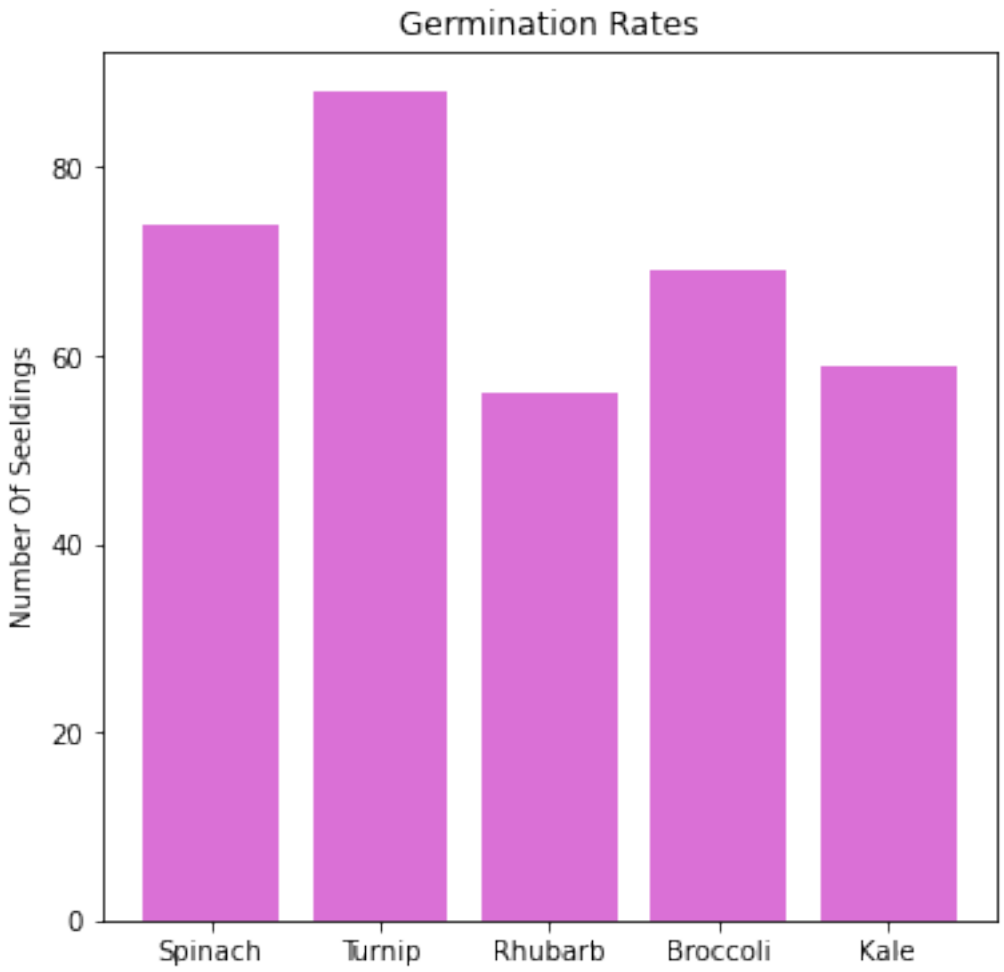
[ ]:
```
plt.figure(figsize=(5,5))
plt.plot(nums, color="teal", label="x")
plt.plot(nums**2, color="olive", label="x squared")
plt.plot(nums**3, color="purple",label="x cubed")
plt.legend(loc="center left", shadow=False, frameon=True, facecolor="green")
```

1.2 Bar Plots

[2]:
```
plants = ['Spinach', 'Turnip', 'Rhubarb', 'Broccoli', 'Kale']
died = [10,25,5,30,21]
germinated = [74, 88, 56,69,59]
```

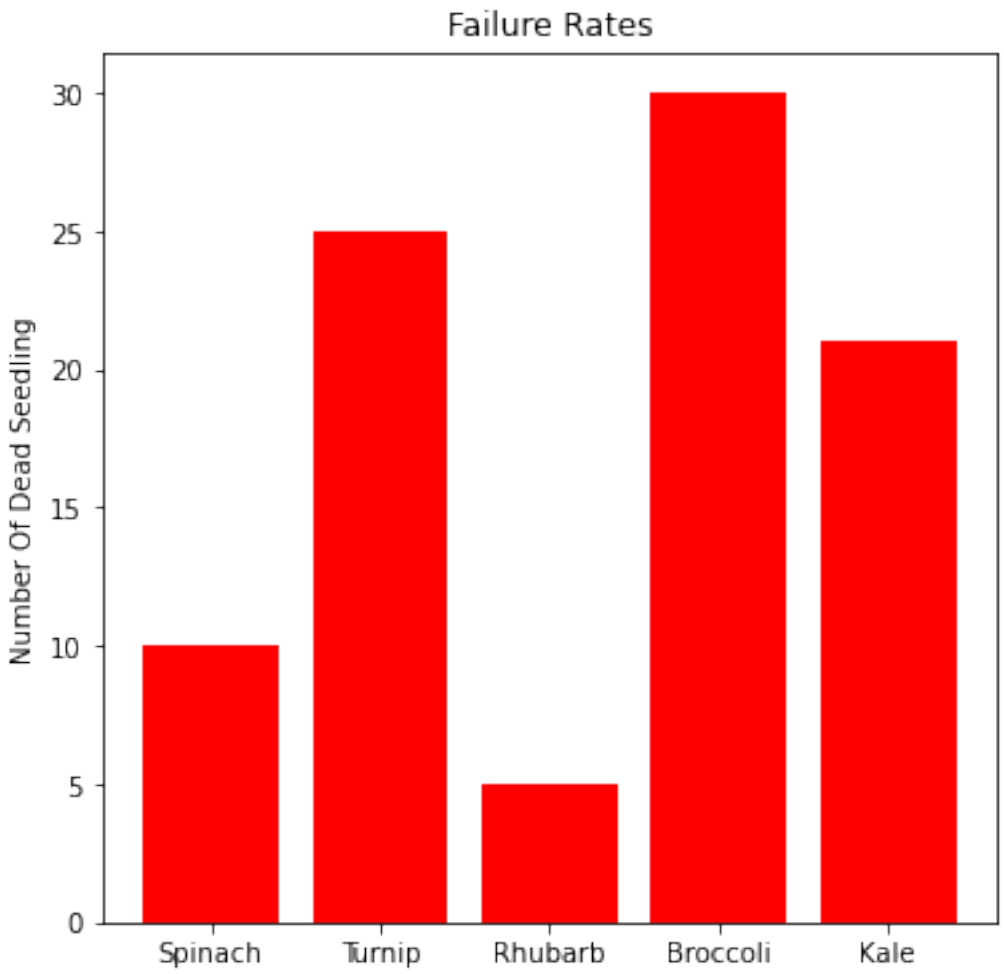
[3]:
```
plt.figure(figsize=(6,6))
plt.bar(plants, germinated, color="orchid")
plt.title("Germination Rates")
plt.ylabel("Number Of Seeldings")
```

[3]: Text(0, 0.5, 'Number Of Seeldings')



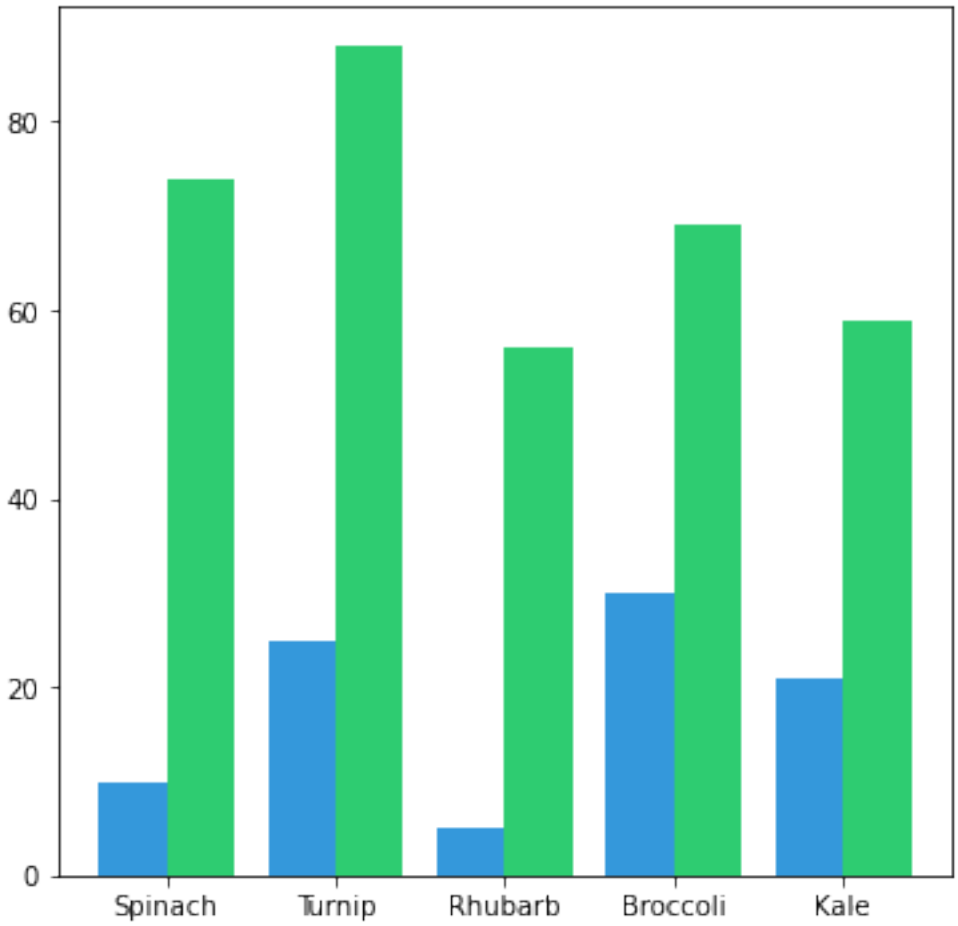
[4]:
```
plt.figure(figsize=(6,6))
plt.bar(plants, died, color="red")
plt.title("Failure Rates")
plt.ylabel("Number Of Dead Seedling")
```

[4]: Text(0, 0.5, 'Number Of Dead Seedling')



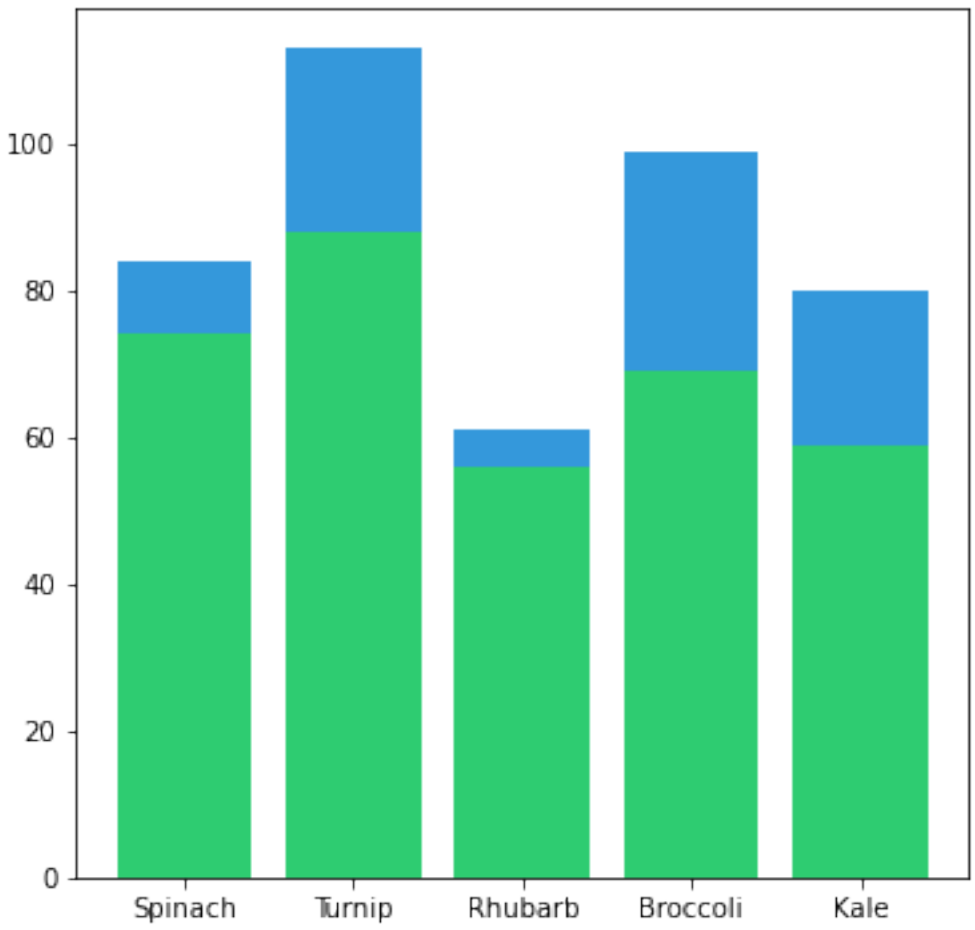
[9]:
```
plt.figure(figsize=(6,6))
plt.bar(plants, died, color="#3498db")
plt.bar(plants, germinated,width =0.4, color="#2ecc71",align = 'edge')
```

[9]: <BarContainer object of 5 artists>

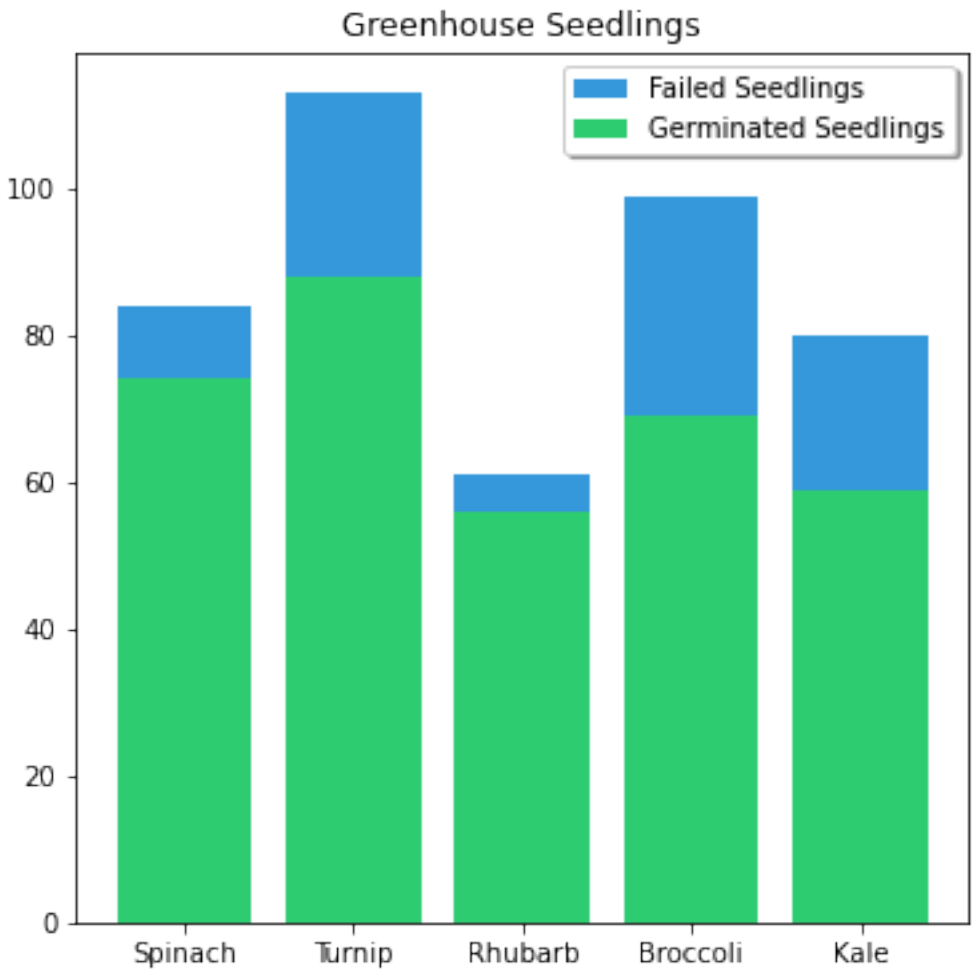


[10]:
```
plt.figure(figsize=(6,6))
plt.bar(plants, died, color="#3498db", bottom=germinated )
plt.bar(plants, germinated, color="#2ecc71")
```

[10]: <BarContainer object of 5 artists>

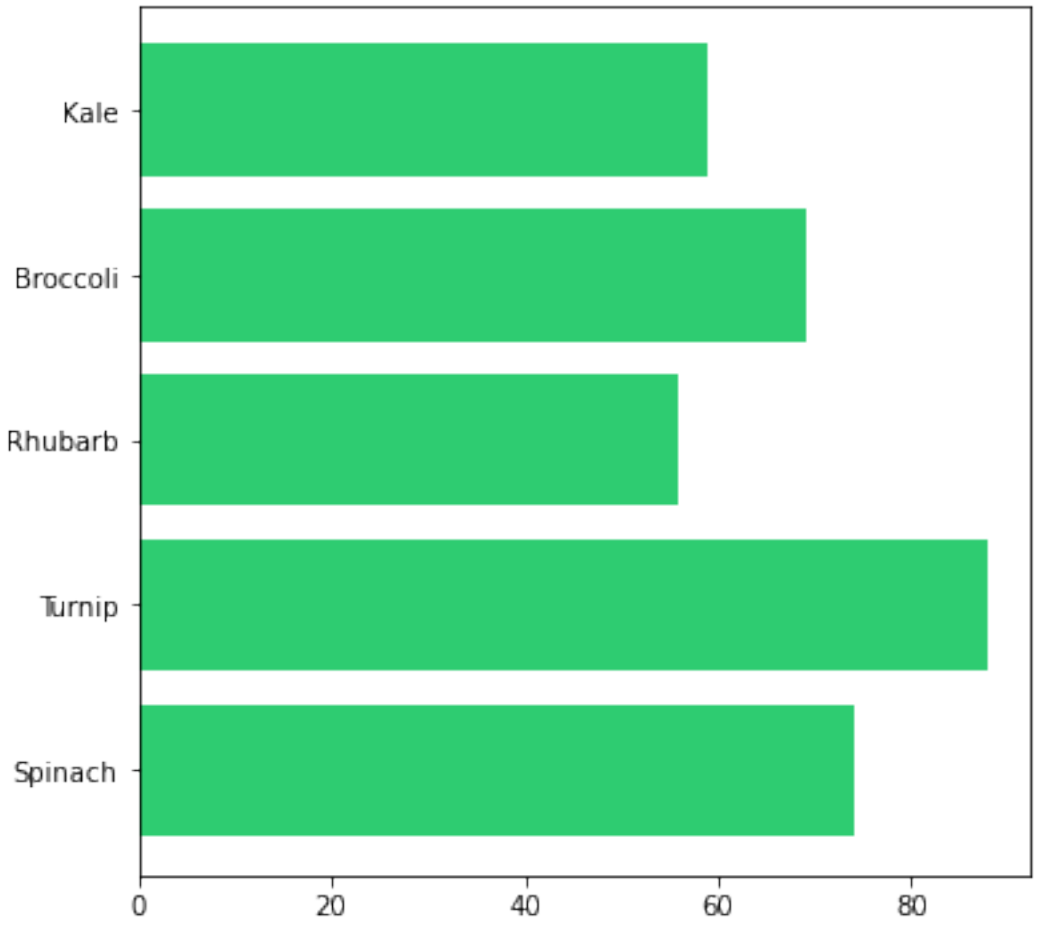


[11]:
```
plt.figure(figsize=(6,6))
plt.bar(plants, died, color="#3498db", bottom=germinated,label="Failed␣
 ↪Seedlings")
plt.bar(plants, germinated, color="#2ecc71", label="Germinated Seedlings")
plt.legend(shadow=True, frameon=True, facecolor="white")
plt.title("Greenhouse Seedlings")
plt.show()
```



[12]:
```
plt.figure(figsize=(6,6))
plt.barh(plants, germinated, color="#2ecc71")
```

[12]: <BarContainer object of 5 artists>

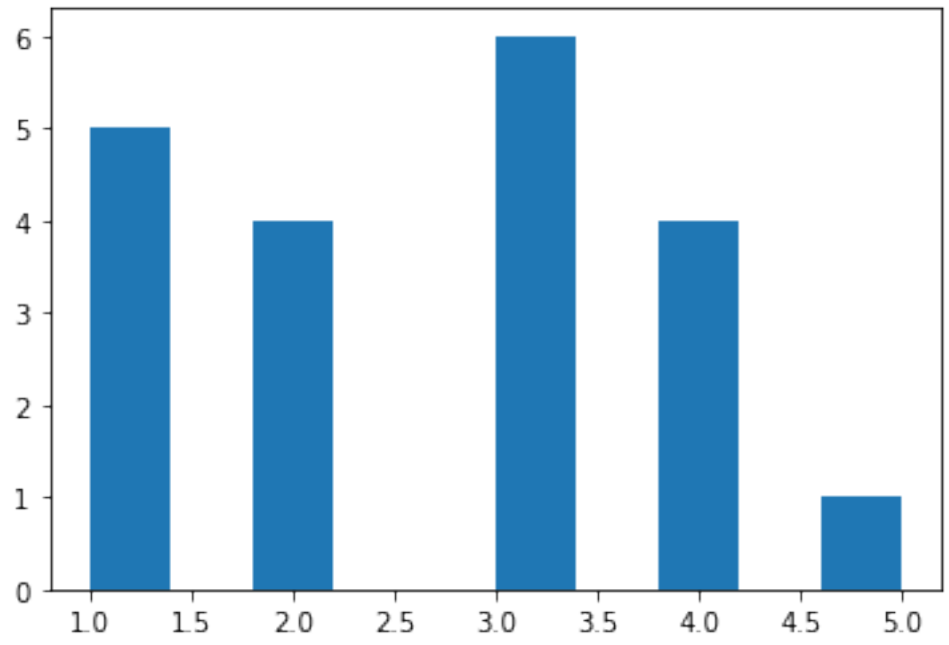


[ ]:

1.3 Histograms

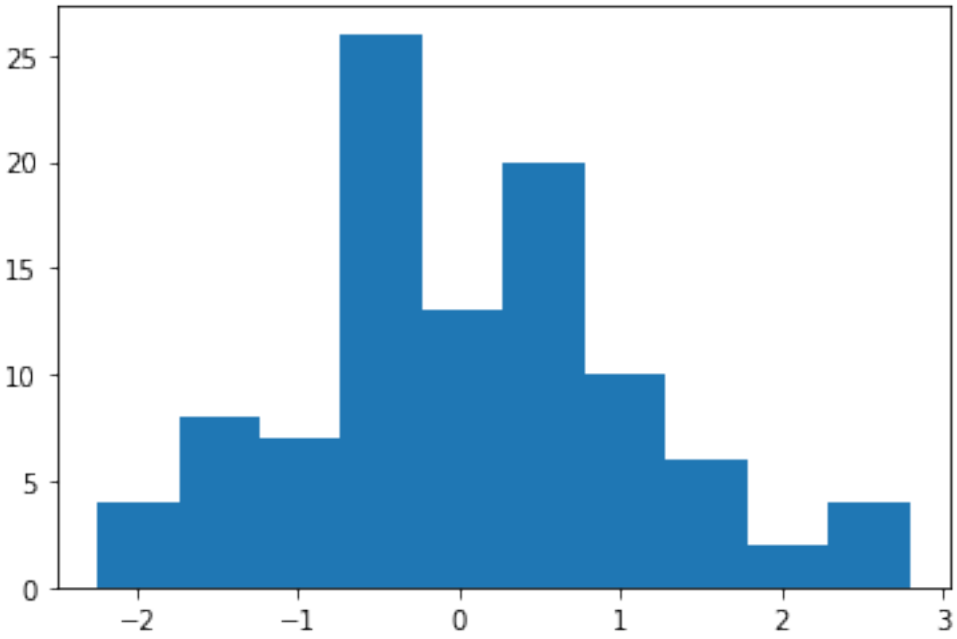
[13]:
```
plt.hist([1,1,2,3,3,3,3,3,4,4,4,5,1,2,1,2,1,2,3,4])
```

[13]:
```
(array([5., 0., 4., 0., 0., 6., 0., 4., 0., 1.]),
 array([1. , 1.4, 1.8, 2.2, 2.6, 3. , 3.4, 3.8, 4.2, 4.6, 5. ]),
 <BarContainer object of 10 artists>)
```



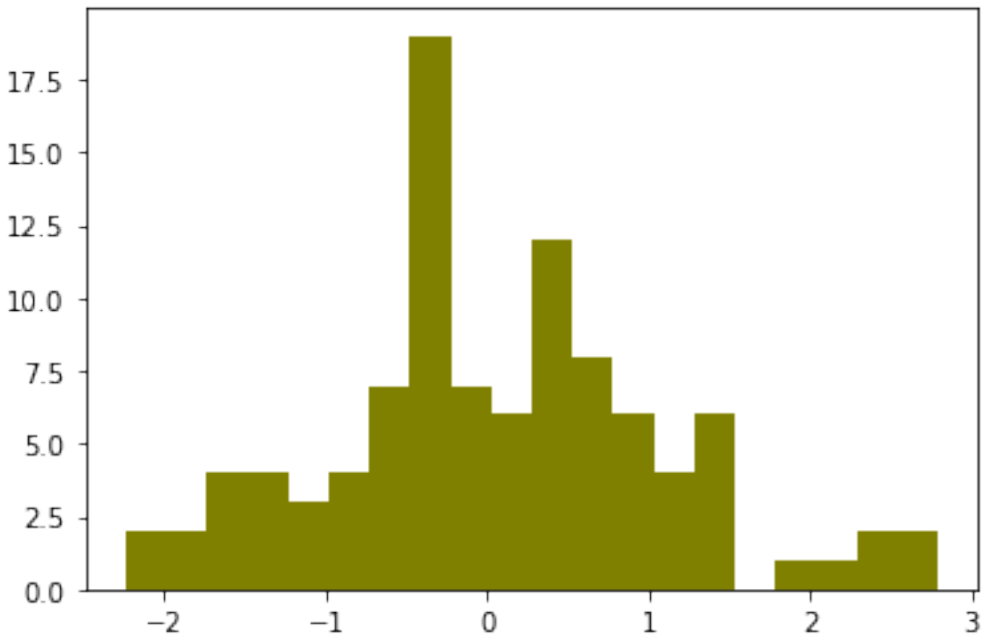
[15]:
```
import numpy as np
nums = np.random.randn(100)
plt.hist(nums)
```

[15]:
```
(array([ 4.,  8.,  7., 26., 13., 20., 10.,  6.,  2.,  4.]),
 array([-2.24266812, -1.73944339, -1.23621867, -0.73299394, -0.22976922,
         0.27345551,  0.77668023,  1.27990496,  1.78312968,  2.28635441,
         2.78957913]),
 <BarContainer object of 10 artists>)
```



[16]:
```
plt.hist(nums, bins=20, color="olive")
```

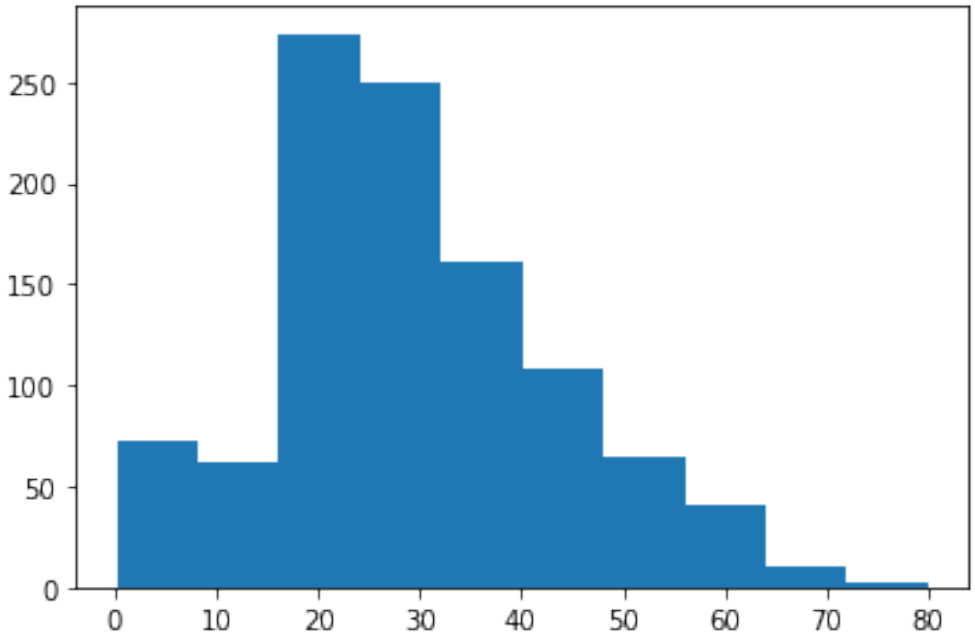
[16]:
```
(array([ 2.,  2.,  4.,  4.,  3.,  4.,  7., 19.,  7.,  6., 12.,  8.,  6.,
         4.,  6.,  0.,  1.,  1.,  2.,  2.]),
 array([-2.24266812, -1.99105576, -1.73944339, -1.48783103, -1.23621867,
        -0.98460631, -0.73299394, -0.48138158, -0.22976922,  0.02184314,
         0.27345551,  0.52506787,  0.77668023,  1.02829259,  1.27990496,
         1.53151732,  1.78312968,  2.03474204,  2.28635441,  2.53796677,
         2.78957913]),
 <BarContainer object of 20 artists>)
```



[18]:
```
import pandas as pd
titanic = pd.read_csv("C:/Users/ashuv/Desktop/DataAnalysis/data/titanic.csv")
titanic["age"] = pd.to_numeric(titanic["age"], errors="coerce")
```

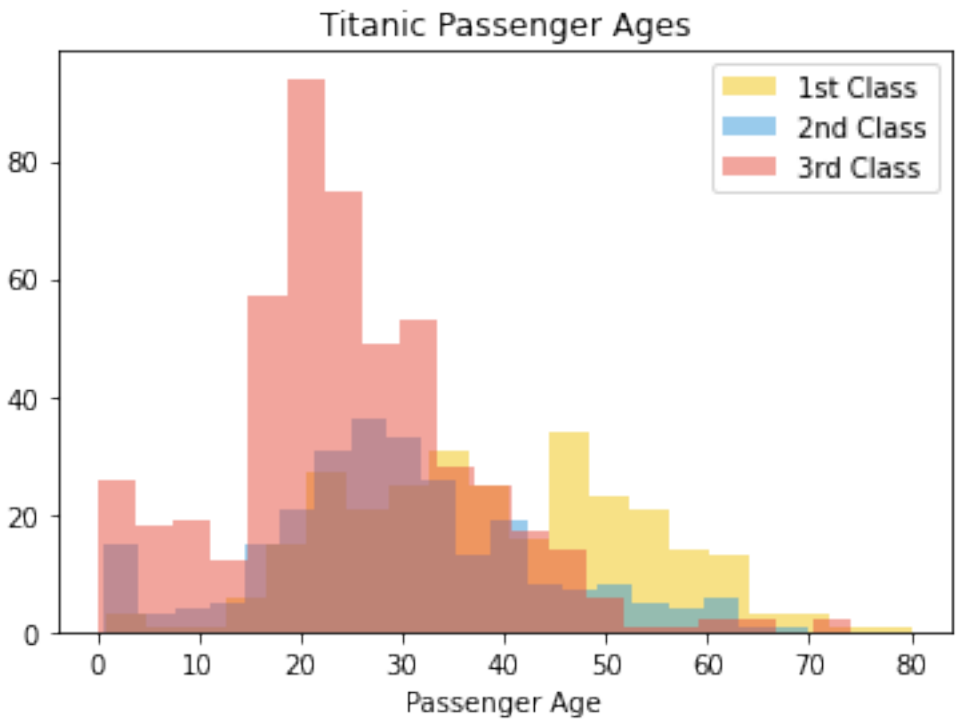
[19]:
```
plt.hist(titanic["age"])
```

[19]:
```
(array([ 72.,  62., 274., 250., 161., 108.,  65.,  41.,  10.,   3.]),
 array([ 0.1667 ,  8.15003, 16.13336, 24.11669, 32.10002, 40.08335,
        48.06668, 56.05001, 64.03334, 72.01667, 80.     ]),
 <BarContainer object of 10 artists>)
```



[20]:
```
first_class = titanic[titanic["pclass"] == 1]["age"]
second_class = titanic[titanic["pclass"] == 2]["age"]
third_class = titanic[titanic["pclass"] == 3]["age"]
plt.hist(first_class, label="1st Class", alpha=0.5, color="#f1c40f", bins=20)
plt.hist(second_class, label="2nd Class", alpha=0.5, color="#3498db", bins=20)
plt.hist(third_class, label="3rd Class", alpha=0.5, color="#e74c3c", bins=20)
plt.legend()
plt.title("Titanic Passenger Ages")
plt.xlabel("Passenger Age")
```

[20]:
```
Text(0.5, 0, 'Passenger Age')
```



1.4 Scatter Plots

[ ]:
```
heights = [137,140,142,145,147,150,152,155,157,160]
f_weights = [28.5,30.8,32.6,34.9,36.4,39,40.8,43.1,44.9,47.2]
m_weights = [34.9,38.1,33.5,35.8,46.7, 42.8,43.1,45.8,50.8,58.9]
```

[ ]:
```
plt.scatter(heights, f_weights,  marker="*", label="Female")
plt.scatter(heights, m_weights,marker="d", label="Male")
plt.legend()
plt.xlabel("Height (cm)")
plt.ylabel("Weight (kg)")
```

1.5 Pie Charts

[ ]:
```
labels = ["Turkey", "Potatoes", "Pumpkin Pie", "Stuffing"]
prices = [25.99,3.24,9.50, 6.99]
```

[ ]:
```
plt.pie(prices, labels=labels, autopct="%1.1f%%", shadow=True, explode=(0,0,0.
↪1,0))
plt.show()
```

1.6 Subplots

[ ]:
```
nums = np.arange(5)
plt.figure(figsize=(10,4))
plt.suptitle("Our First Subplot", fontsize=30)

plt.subplot(1,3,1)
plt.title("X")
plt.plot(nums, nums)

plt.subplot(1,3,2)
plt.plot(nums, nums**2, color="red")
plt.title("X Squared")


plt.subplot(1,3,3)
plt.plot(nums, nums**3, color="yellow")
plt.title("X Cubed")
plt.tight_layout()
plt.show()
```

[ ]:
```
nums = np.arange(5)
plt.figure(figsize=(4,10))
plt.suptitle("Our First Subplot", fontsize=30)

plt.subplot(3,1,1)
plt.title("X")
plt.plot(nums, nums)

plt.subplot(3,1,2)
plt.plot(nums, nums**2, color="red")
plt.title("X Squared")


plt.subplot(3,1,3)
plt.plot(nums, nums**3, color="yellow")
plt.title("X Cubed")
plt.tight_layout()
plt.show()
```

[ ]:
```
plt.figure(figsize=(8,8))
plt.subplot(2,2,1)
plt.plot(nums)

plt.subplot(2,2,2)
plt.plot(nums)
```

```
plt.subplot(2,2,3)
plt.plot(nums)


plt.subplot(2,2,4)
plt.plot(nums)
```

[ ]:
```
first_class = titanic[titanic["pclass"] == 1]["age"]
second_class = titanic[titanic["pclass"] == 2]["age"]
third_class = titanic[titanic["pclass"] == 3]["age"]
plt.hist(third_class, label="3rd Class", alpha=0.5, color="#e74c3c", bins=20)
plt.hist(second_class, label="2nd Class", alpha=0.5, color="#3498db", bins=20)
plt.hist(first_class, label="1st Class", alpha=0.5, color="#f1c40f", bins=20)
plt.legend()
plt.title("Titanic Passenger Ages")
plt.xlabel("Passenger Age")
```

[ ]:
```
first_class = titanic[titanic["pclass"] == 1]["age"]
second_class = titanic[titanic["pclass"] == 2]["age"]
third_class = titanic[titanic["pclass"] == 3]["age"]

plt.figure(figsize=(10,4))
ax = plt.subplot(1,3,1)
plt.hist(first_class, label="1st Class", color="#f1c40f", bins=20)
plt.title("1st Class")

plt.subplot(1,3,2, sharey=ax)
plt.hist(second_class, label="2nd Class", color="#3498db", bins=20)
plt.title("2nd Class")


plt.subplot(1,3,3, sharey=ax)
plt.hist(third_class, label="3rd Class", color="#e74c3c", bins=20)
plt.title("3rd Class")
```

1.7 The Object-Oriented Approach

[ ]:
```
fig, axs = plt.subplots(1,2)
```

[ ]:
```
axs[0].hist(first_class)
axs[1].hist(second_class)
axs[0].hist(third_class)
axs[0].set_title("My Title")
axs[0].set_xlabel("Age")
axs[1].set_title("My Other Title")
fig
```

[ ]:
```
fig, axs = plt.subplots(2,2)
axs[0][0].plot(nums,color="red")
axs[0][1].plot(nums*nums)
axs[1][0].plot(nums**3)
axs[1][1].plot(1/nums)

axs[0][1].set_xticks([0,2,4])
```

[ ]:
```
fig, ax = plt.subplots()
ax.plot(nums)
ax.plot(nums*nums)
```

[ ]:
```

```