```
import matplotlib.pyplot as plt
%matplotlib inline
import pandas as pd
import numpy as np
```

```
df = pd.read_csv("/content/bmi.csv")
df
#df.drop(columns = ["BmiClass"])
```

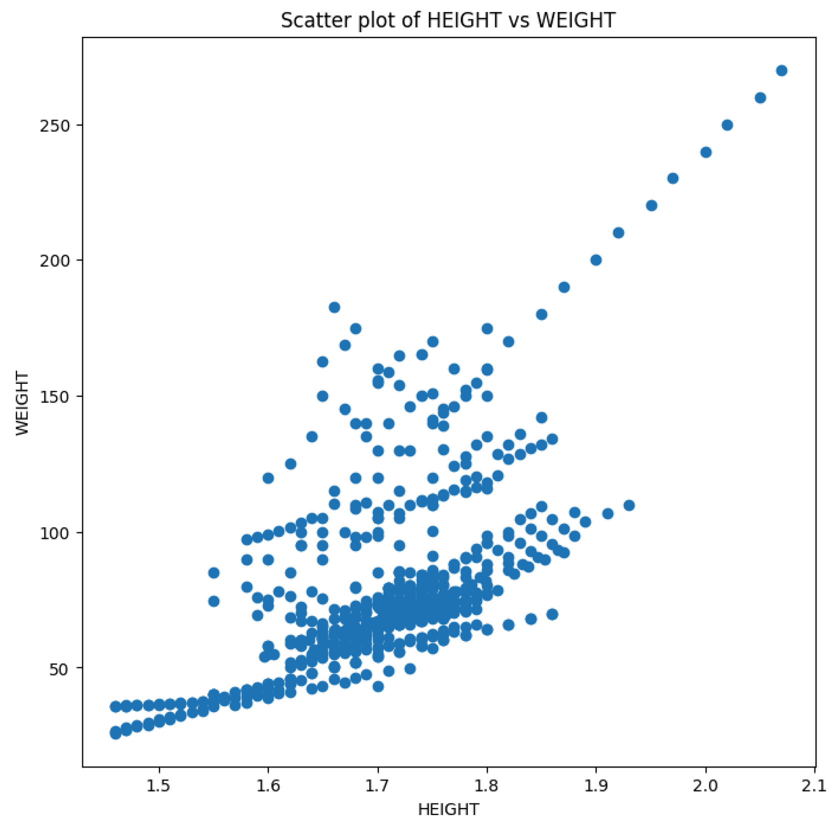
	Age	Height	Weight	Bmi	BmiClass
0	61	1.85	109.30	31.935720	Obese Class 1
1	60	1.71	79.02	27.023700	Overweight
2	60	1.55	74.70	31.092612	Obese Class 1
3	60	1.46	35.90	16.841809	Underweight
4	60	1.58	97.10	38.896010	Obese Class 2
...	...	...	...	...	...
736	34	1.86	95.70	27.662157	Overweight
737	44	1.91	106.90	29.302925	Overweight
738	25	1.82	88.40	26.687598	Overweight
739	35	1.88	98.50	27.868945	Overweight
740	45	1.93	109.90	29.504148	Overweight

741 rows × 5 columns

Scatter Plot

```
plt.figure(figsize=(8,8))
plt.scatter(df['Height'], df['Weight'])
plt.xlabel("HEIGHT")
plt.ylabel("WEIGHT")
plt.title("Scatter plot of HEIGHT vs WEIGHT")
```

```
Text(0.5, 1.0, 'Scatter plot of HEIGHT vs WEIGHT')
```

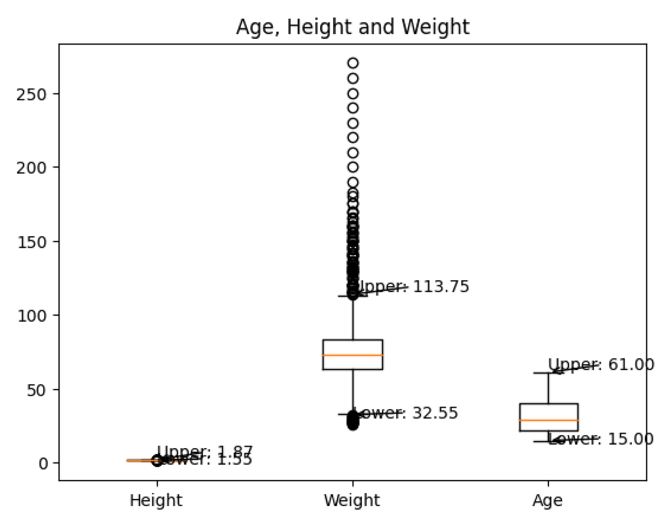



```
df["Height"].corr(df["Weight"])
```

```
0.6076716078109788
```

Box Plot

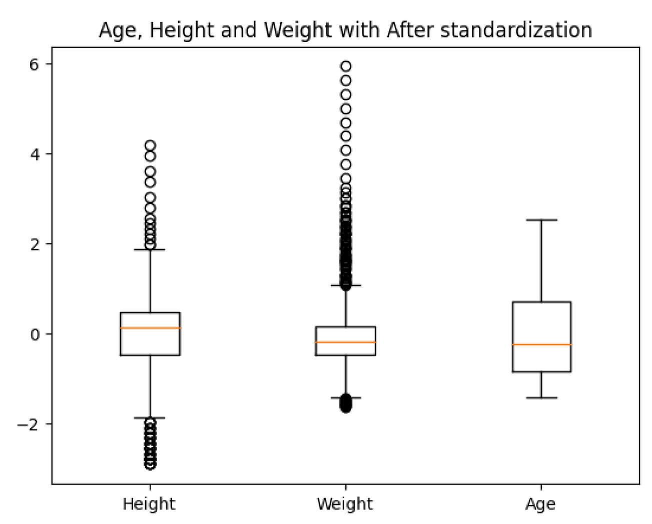
```
data = [df["Height"], df["Weight"],df["Age"]]

fig2, ax2 = plt.subplots()
ax2.set_title('Age, Height and Weight')
boxplot = ax2.boxplot(data,labels=["Height","Weight","Age"])

for i in range(len(data)):
    current_data = data[i]

    q1 = current_data.quantile(0.25)
    q3 = current_data.quantile(0.75)
    iqr = q3 - q1

    lower_whisker = max(current_data.min(), q1 - 1.5 * iqr)
    upper_whisker = min(current_data.max(), q3 + 1.5 * iqr)

    ax2.annotate(f'Lower: {lower_whisker:.2f}', xy=(i + 1, lower_whisker),
                 xytext=(i + 1, lower_whisker - 2),
                 arrowprops=dict(arrowstyle='->'))
    ax2.annotate(f'Upper: {upper_whisker:.2f}', xy=(i + 1, upper_whisker),
                 xytext=(i + 1, upper_whisker + 2),
                 arrowprops=dict(arrowstyle='->'))

plt.show()
```



Standraised coordinates

```
df['Height_z'] = (df['Height'] - df['Height'].mean()) / df['Height'].std()
df['Weight_z'] = (df['Weight'] - df['Weight'].mean()) / df['Weight'].std()
df['Age_z'] = (df['Age'] - df['Age'].mean()) / df['Age'].std()
```

```
data = [df["Height_z"], df["Weight_z"],df["Age_z"]]

fig2, ax2 = plt.subplots()
ax2.set_title('Age, Height and Weight with After standardization')
ax2.boxplot(data,labels=["Height","Weight","Age"])

plt.show()
```



Removing Outliers

```
df_clean = df[(df["Weight"] < 115) & (df["Weight"] > 32)]
df_clean

df_clean = df_clean[(df["Height"] < 1.88) & (df["Height"] > 1.54)]
df_clean
```

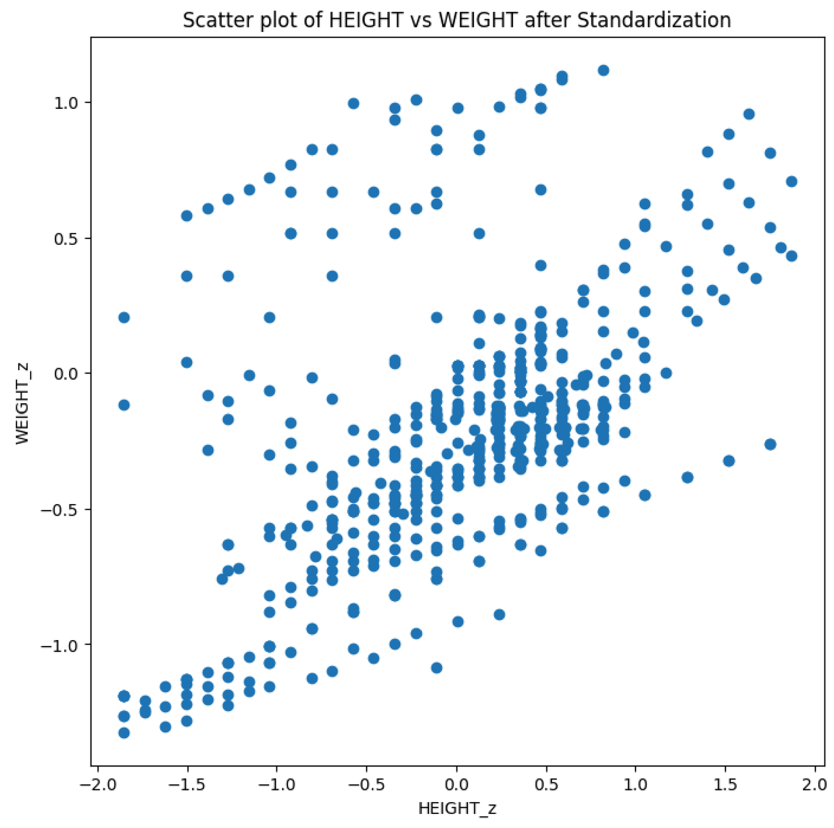
```
<ipython-input-10-1a9b1343b6d1>:4: UserWarning: Boolean Series key will be reindexed to match DataFrame index.
  df_clean = df_clean[(df["Height"] < 1.88) & (df["Height"] > 1.54)]
```

	Age	Height	Weight	Bmi	BmiClass	Height_z	Weight_z	Age_z
0	61	1.85	109.30	31.935720	Obese Class 1	1.635053	0.957617	2.520870
1	60	1.71	79.02	27.023700	Overweight	0.006662	0.018835	2.435073
2	60	1.55	74.70	31.092612	Obese Class 1	-1.854356	-0.115100	2.435073
4	60	1.58	97.10	38.896010	Obese Class 2	-1.505416	0.579376	2.435073
5	59	1.71	79.32	27.126295	Overweight	0.006662	0.028136	2.349277
...	...	...	...	...	...	...	...	...
732	23	1.78	83.30	26.290872	Overweight	0.820857	0.151529	-0.739403
733	33	1.84	93.10	27.498819	Overweight	1.518739	0.455362	0.118564
735	24	1.80	85.80	26.481481	Overweight	1.053484	0.229038	-0.653606
736	34	1.86	95.70	27.662157	Overweight	1.751366	0.535971	0.204360
738	25	1.82	88.40	26.687598	Overweight	1.286112	0.309646	-0.567809

616 rows × 8 columns

```
plt.figure(figsize=(8,8))
plt.scatter(df_clean['Height_z'], df_clean['Weight_z'])
plt.xlabel("HEIGHT_z")
plt.ylabel("WEIGHT_z")
plt.title("Scatter plot of HEIGHT vs WEIGHT after Standardization")
```

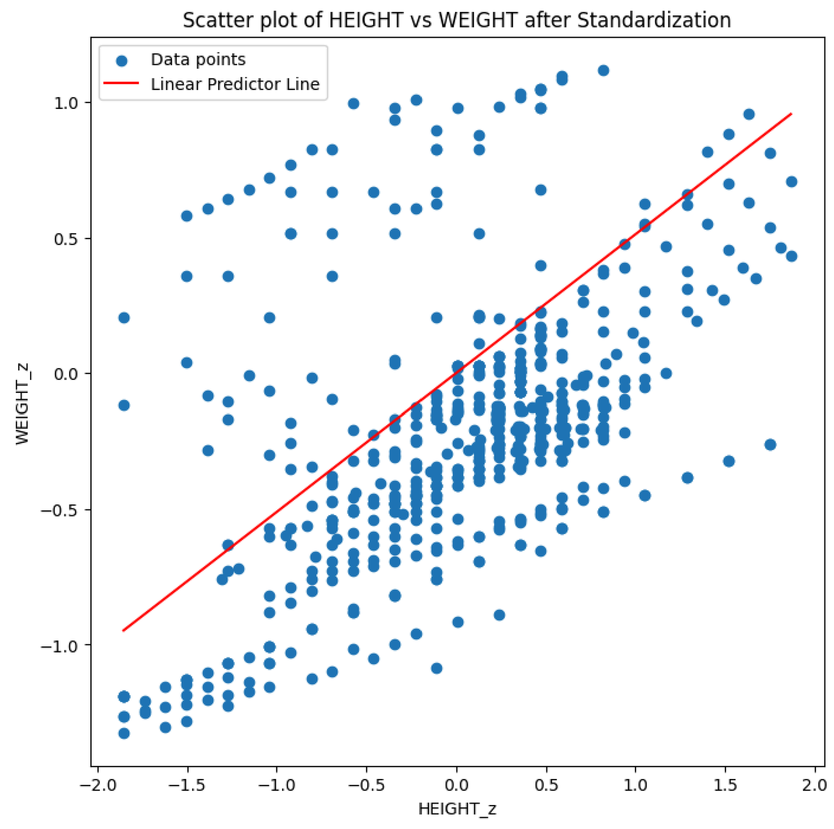
```
Text(0.5, 1.0, 'Scatter plot of HEIGHT vs WEIGHT after Standardization')
```




```
df_clean["Height"].corr(df_clean["Weight"])
```

```
0.5111477495314264
```

```
import numpy as np
import matplotlib.pyplot as plt

r = df_clean["Height"].corr(df_clean["Weight"])

plt.figure(figsize=(8, 8))
plt.scatter(df_clean['Height_z'], df_clean['Weight_z'], label='Data points')

x_values = np.linspace(df_clean['Height_z'].min(), df_clean['Height_z'].max(), 100)
#linear predictor y = ax + b
y_values = r * x_values
plt.plot(x_values, y_values, color='red', label='Linear Predictor Line')

plt.xlabel("HEIGHT_z")
plt.ylabel("WEIGHT_z")
plt.title("Scatter plot of HEIGHT vs WEIGHT after Standardization")
plt.legend()

plt.show()
```

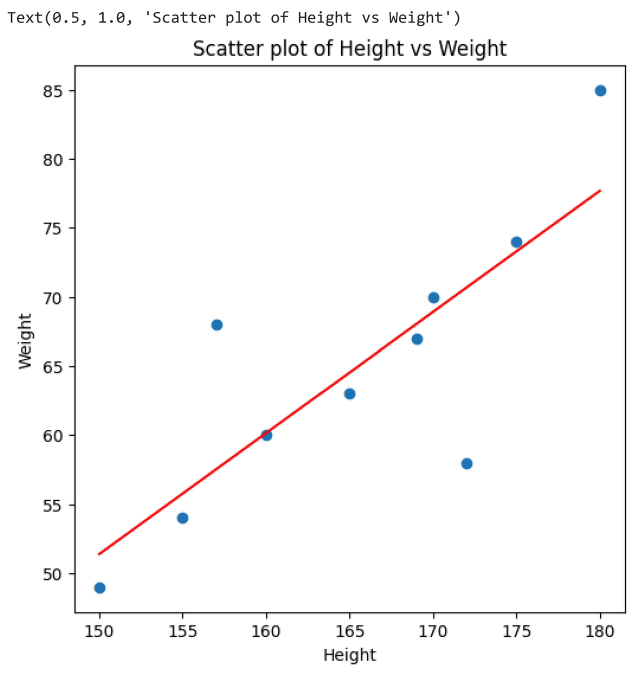


Class Activity

```
data = {
    "height" : [150, 155, 160, 165, 170, 157, 172, 180, 175, 169],
    "weight": [49, 54, 60, 63, 70, 68, 58, 85, 74, 67]
}
```

```
data = pd.DataFrame(data)
data['height_z'] = (data['height'] - data['height'].mean()) / data['height'].std()
data['weight_z'] = (data['weight'] - data['weight'].mean()) / data['weight'].std()

r = data["height"].corr(data["weight"])
mean_of_weight = data["weight"].mean()
std_of_weight = data["weight"].std()
mean_of_height = data["height"].mean()
std_of_height = data["height"].std()

plt.figure(figsize=(6,6))
plt.scatter(data['height'], data['weight'])

x_values = np.linspace(data['height_z'].min(), data['height_z'].max(), 100)
#linear predictor y = ax + b
y_values = std_of_weight * r * x_values + mean_of_weight
x_values = std_of_height * x_values + mean_of_height
plt.plot(x_values, y_values, color='red', label='Linear Predictor Line')


plt.xlabel("Height")
plt.ylabel("Weight")
plt.title("Scatter plot of Height vs Weight")
```

```
Text(0.5, 1.0, 'Scatter plot of Height vs Weight')
```




```
print(r)
```

```
0.8081009161331261
```

Start coding or generate with AI.