

In [1]:

```
import numpy as np
import pandas as pd
```

In [2]:

```
dataset = pd.read_csv(r"C:\Users\kotha\Downloads\fish.csv")
```

In [3]:

```
dataset
```

Out[3]:

	Species	Weight	Length1	Length2	Length3	Height	Width
0	Bream	242.0	23.2	25.4	30.0	11.5200	4.0200
1	Bream	290.0	24.0	26.3	31.2	12.4800	4.3056
2	Bream	340.0	23.9	26.5	31.1	12.3778	4.6961
3	Bream	363.0	26.3	29.0	33.5	12.7300	4.4555
4	Bream	430.0	26.5	29.0	34.0	12.4440	5.1340
...
154	Smelt	12.2	11.5	12.2	13.4	2.0904	1.3936
155	Smelt	13.4	11.7	12.4	13.5	2.4300	1.2690
156	Smelt	12.2	12.1	13.0	13.8	2.2770	1.2558
157	Smelt	19.7	13.2	14.3	15.2	2.8728	2.0672
158	Smelt	19.9	13.8	15.0	16.2	2.9322	1.8792

159 rows × 7 columns

In [4]:

```
dataset.isnull().any()
```

Out[4]:

```
Species    False
Weight     False
Length1    False
Length2    False
Length3    False
Height     False
Width      False
dtype: bool
```

In [5]:

```
dataset.isnull().sum()
```

Out[5]:

```
Species      0
Weight       0
Length1      0
Length2      0
Length3      0
Height       0
Width        0
dtype: int64
```

In [6]:

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
dataset["Species"] = le.fit_transform(dataset["Species"])
```

In [7]:

```
dataset.head(1)
```

Out[7]:

	Species	Weight	Length1	Length2	Length3	Height	Width
0	0	242.0	23.2	25.4	30.0	11.52	4.02

In [8]:

```
x = dataset.iloc[:,[0,2,3,4,5,6]].values
y = dataset.iloc[:,1:2].values
```

In [9]:

```
from sklearn.preprocessing import OneHotEncoder
one = OneHotEncoder()
z = one.fit_transform(x[:,0:1]).toarray()
x = np.delete(x,0,axis=1)
x = np.concatenate((z,x),axis=1)
```

In [10]:

```
x.shape
```

Out[10]:

```
(159, 12)
```

In [11]:

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size = 0.2,random_state=0)
```

In [12]:

```
from sklearn.linear_model import LinearRegression
mlr = LinearRegression()
mlr.fit(x_train,y_train)
```

Out[12]:

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=False)
```

In [13]:

x_test

Out[13]:

```

array([[ 1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        27.6   , 30.    , 35.    , 12.67  , 4.69   ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,
        19.    , 20.5   , 22.8   , 6.4752 , 3.3516 ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        21.5   , 23.5   , 25.    , 6.275  , 3.725  ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,
        20.5   , 22.5   , 25.3   , 7.0334 , 3.8203 ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        32.    , 34.5   , 36.5   , 10.2565, 6.3875 ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        37.    , 40.    , 42.5   , 11.73  , 7.225  ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  1.    ,
        33.7   , 36.4   , 39.6   , 11.7612, 6.5736 ],
       [ 0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,
        34.8   , 37.3   , 39.8   , 6.2884 , 4.0198 ],
       [ 1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        37.4   , 41.    , 45.9   , 18.6354, 6.7473 ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        19.    , 21.    , 22.5   , 5.9175 , 3.3075 ],
       [ 0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,
        30.    , 32.3   , 34.8   , 5.568  , 3.3756 ],
       [ 0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,
        40.    , 42.5   , 45.5   , 7.28   , 4.3225 ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  1.    ,
        37.3   , 40.    , 43.5   , 12.354 , 6.525  ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        40.2   , 43.5   , 46.    , 12.604 , 8.142  ],
       [ 0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        14.3   , 15.5   , 17.4   , 6.5772 , 2.3142 ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,
        17.5   , 18.8   , 21.2   , 5.5756 , 2.9044 ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,
        20.5   , 22.    , 24.3   , 6.6339 , 3.5478 ],
       [ 0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,
        56.    , 60.    , 64.    , 9.6    , 6.144  ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        19.3   , 21.3   , 22.8   , 6.384  , 3.534  ],
       [ 1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        32.    , 35.    , 40.6   , 16.3618, 6.09   ],
       [ 0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        13.5   , 14.7   , 16.5   , 6.8475 , 2.3265 ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,
        29.5   , 31.7   , 35.    , 9.485  , 5.355  ],
       [ 0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        20.    , 22.    , 23.5   , 6.11   , 3.4075 ],
       [ 0.    ,  0.    ,  0.    ,  1.    ,  0.    ,  0.    ,  0.    ,
        59.    , 63.4   , 68.    , 10.812 , 7.48   ],
       [ 0.    ,  1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        16.3   , 17.7   , 19.8   , 7.4052 , 2.673  ],
       [ 1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        27.6   , 30.    , 35.1   , 14.0049, 4.8438 ],
       [ 1.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,
        31.9   , 35.    , 40.5   , 16.2405, 5.589  ],
       [ 0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  0.    ,  1.    ,

```

```

24.1 , 26.5 , 29.3 , 8.1454, 4.2485],
[ 0. , 0. , 1. , 0. , 0. , 0. , 0. ,
36.9 , 40. , 42.3 , 11.9286, 7.1064],
[ 0. , 0. , 0. , 0. , 0. , 1. , 0. ,
10.4 , 11. , 12. , 2.196 , 1.38 ],
[ 1. , 0. , 0. , 0. , 0. , 0. , 0. ,
31. , 33.5 , 38.7 , 14.4738, 5.7276],
[ 0. , 0. , 1. , 0. , 0. , 0. , 0. ,
20. , 22. , 23.5 , 5.5225, 3.995 ]])

```

In [14]:

```
y_test
```

Out[14]:

```

array([[ 390. ],
       [  0. ],
       [ 170. ],
       [ 160. ],
       [ 556. ],
       [ 900. ],
       [ 800. ],
       [ 300. ],
       [ 975. ],
       [ 115. ],
       [ 200. ],
       [ 456. ],
       [1000. ],
       [1000. ],
       [ 60. ],
       [ 78. ],
       [ 145. ],
       [1600. ],
       [ 130. ],
       [ 720. ],
       [ 55. ],
       [ 390. ],
       [ 120. ],
       [1650. ],
       [ 90. ],
       [ 450. ],
       [ 700. ],
       [ 270. ],
       [ 850. ],
       [  9.7],
       [ 650. ],
       [ 110. ]])

```

In [15]:

```
y_pred = mlr.predict(x_test)
```

In [16]:

```
y_pred
```

Out[16]:

```
array([[ 428.88533577],
       [  98.08363614],
       [ 216.67998922],
       [ 208.66936638],
       [ 657.24094116],
       [ 876.38855413],
       [ 665.97861965],
       [ 407.27203048],
       [ 965.65306863],
       [ 146.62291102],
       [ 255.15532231],
       [ 561.63685124],
       [ 765.67575361],
       [1012.38234027],
       [-118.72798063],
       [  14.47341216],
       [ 137.60789564],
       [1155.53572308],
       [ 170.97092949],
       [ 724.93548455],
       [-128.48675188],
       [ 525.45508599],
       [ 175.3519065 ],
       [1322.74816983],
       [ -23.0873263 ],
       [ 475.44172778],
       [ 719.96841977],
       [ 280.94571114],
       [ 885.12085107],
       [ -16.63412226],
       [ 585.26038657],
       [ 164.22863371]])
```

In [17]:

```
from sklearn.metrics import r2_score
accuracy = r2_score(y_test,y_pred)
```

In [18]:

```
accuracy
```

Out[18]:

```
0.9102350316202584
```

In [45]:

```
yp = mlr.predict([[0,0,0,0,0,1,0,34.8,55.9,80.2,66.9,23.5]])
```

In [46]:

yp

Out[46]:

array([[5157.76783104]])

In [47]:

x_train

Out[47]:

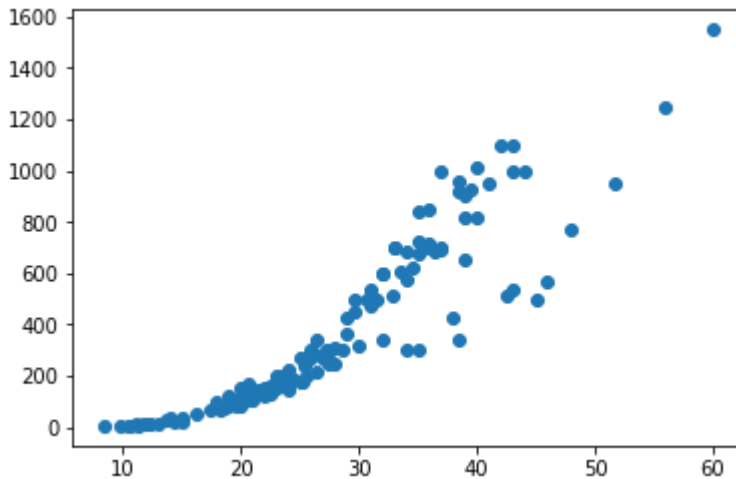
```
array([[ 0.    ,  0.    ,  0.    , ..., 64.    ,  9.6    ,  6.144 ],
       [ 0.    ,  0.    ,  0.    , ..., 38.8    ,  5.9364,  4.3844],
       [ 1.    ,  0.    ,  0.    , ..., 38.3    , 14.8604,  5.2854],
       ...,
       [ 0.    ,  1.    ,  0.    , ..., 23.2    ,  9.396 ,  3.4104],
       [ 0.    ,  0.    ,  1.    , ..., 41.4    , 11.1366,  6.003 ],
       [ 0.    ,  0.    ,  0.    , ..., 25.    ,  6.4    ,  3.8    ]])
```

In [49]:

```
import matplotlib.pyplot as plt
plt.scatter(x_train[:,8],y_train)
```

Out[49]:

<matplotlib.collections.PathCollection at 0x1bfc5f13708>



In []: