Gerry William Nanlohy / 2440018854 / LB01 / Assignment 04

Importing Data from Various Sources

In [1]:
```
import pandas as pd
import numpy as np
import seaborn as sns
sns.set(color_codes = True)
import matplotlib.pyplot as plt
```

Reading Excel Files

In [2]:
```
dataset = pd.read_csv('fish.csv')
dataset.head()
```

Out[2]:

	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

In [3]:
```
dataset.shape
```

Out[3]:
```
(159, 7)
```

Data Reading

In [4]:
```
dataset.describe()
```

Out[4]:

	Weight	Length1	Length2	Length3	Height	Width
count	159.000000	159.000000	159.000000	159.000000	159.000000	159.000000
mean	398.326415	26.247170	28.415723	31.227044	8.970994	4.417486
std	357.978317	9.996441	10.716328	11.610246	4.286208	1.685804
min	0.000000	7.500000	8.400000	8.800000	1.728400	1.047600
25%	120.000000	19.050000	21.000000	23.150000	5.944800	3.385650
50%	273.000000	25.200000	27.300000	29.400000	7.786000	4.248500
75%	650.000000	32.700000	35.500000	39.650000	12.365900	5.584500
max	1650.000000	59.000000	63.400000	68.000000	18.957000	8.142000

In [5]:
```
print(dataset)
```

```
    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 x 7 columns]
```

In [6]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 159 entries, 0 to 158
Data columns (total 7 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   Species  159 non-null    object
 1   Weight   159 non-null    float64
 2   Length1  159 non-null    float64
 3   Length2  159 non-null    float64
 4   Length3  159 non-null    float64
 5   Height   159 non-null    float64
 6   Width    159 non-null    float64
dtypes: float64(6), object(1)
memory usage: 8.8+ KB
```

In [7]:
```
dataset.dtypes
```

Out[7]:
```
Species     object
Weight     float64
Length1    float64
Length2    float64
Length3    float64
Height     float64
Width      float64
dtype: object
```

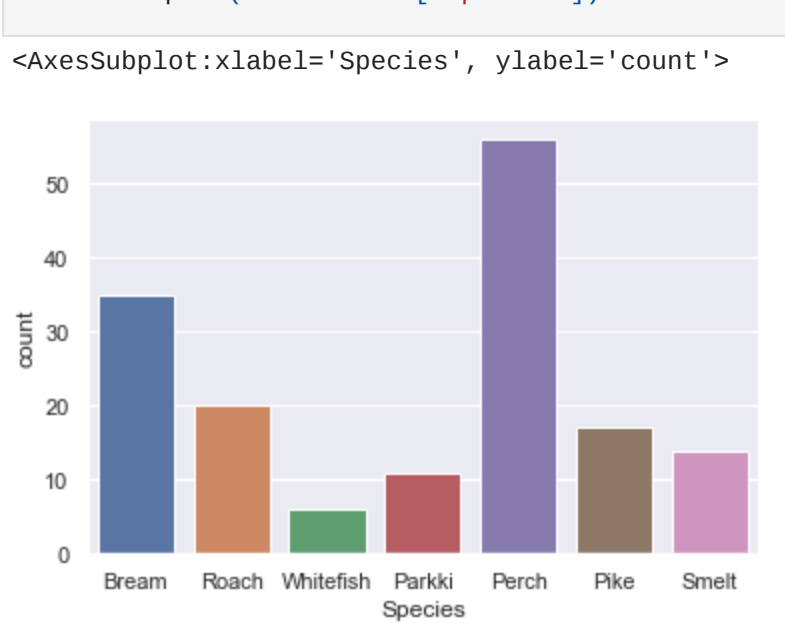
In [8]:
```
dataset.isnull().sum()
```

Out[8]:
```
Species    0
Weight     0
Length1    0
Length2    0
Length3    0
Height     0
Width      0
dtype: int64
```

1. Do Exploratory Data Analysis for Fish Market Dataset

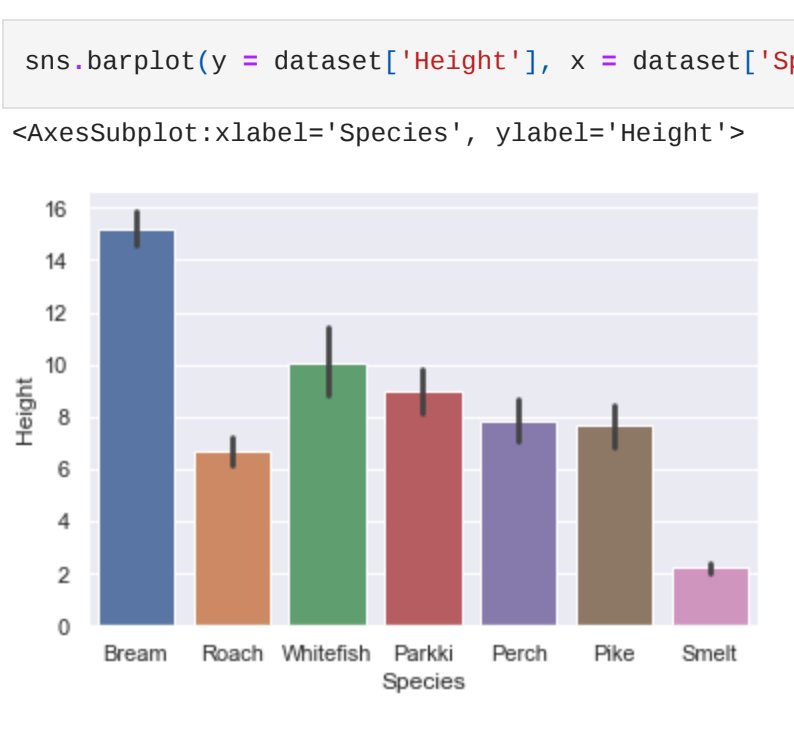
In [9]:
```
sns.countplot(x = dataset['Species'])
```

Out[9]:
```
<AxesSubplot:xlabel='Species', ylabel='count'>
```



In [10]:
```
sns.barplot(y = dataset['Height'], x = dataset['Species'])
```

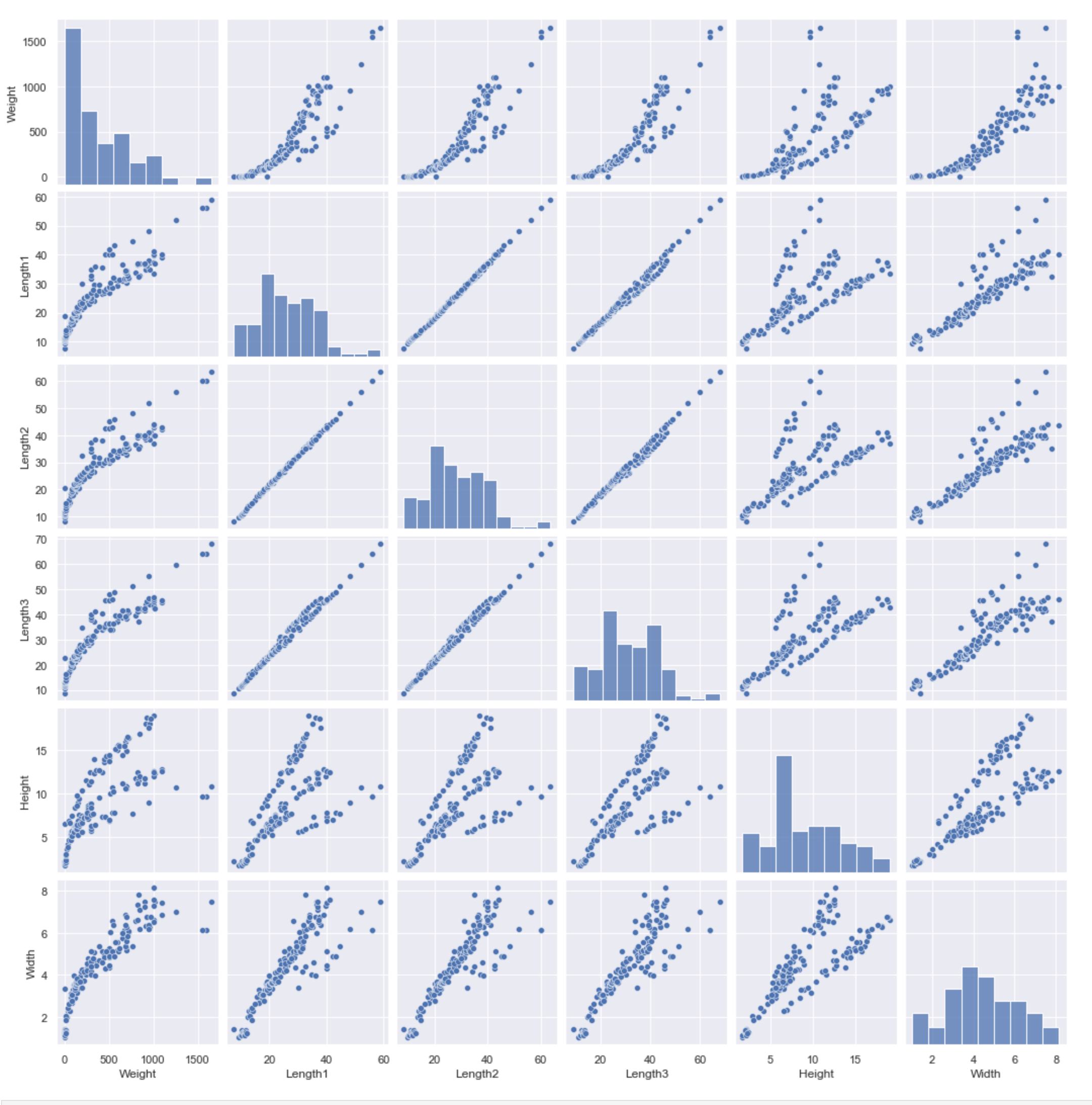
Out[10]:
```
<AxesSubplot:xlabel='Species', ylabel='Height'>
```



2. Please check Pairwise Relationships in a Dataset using Pairplot

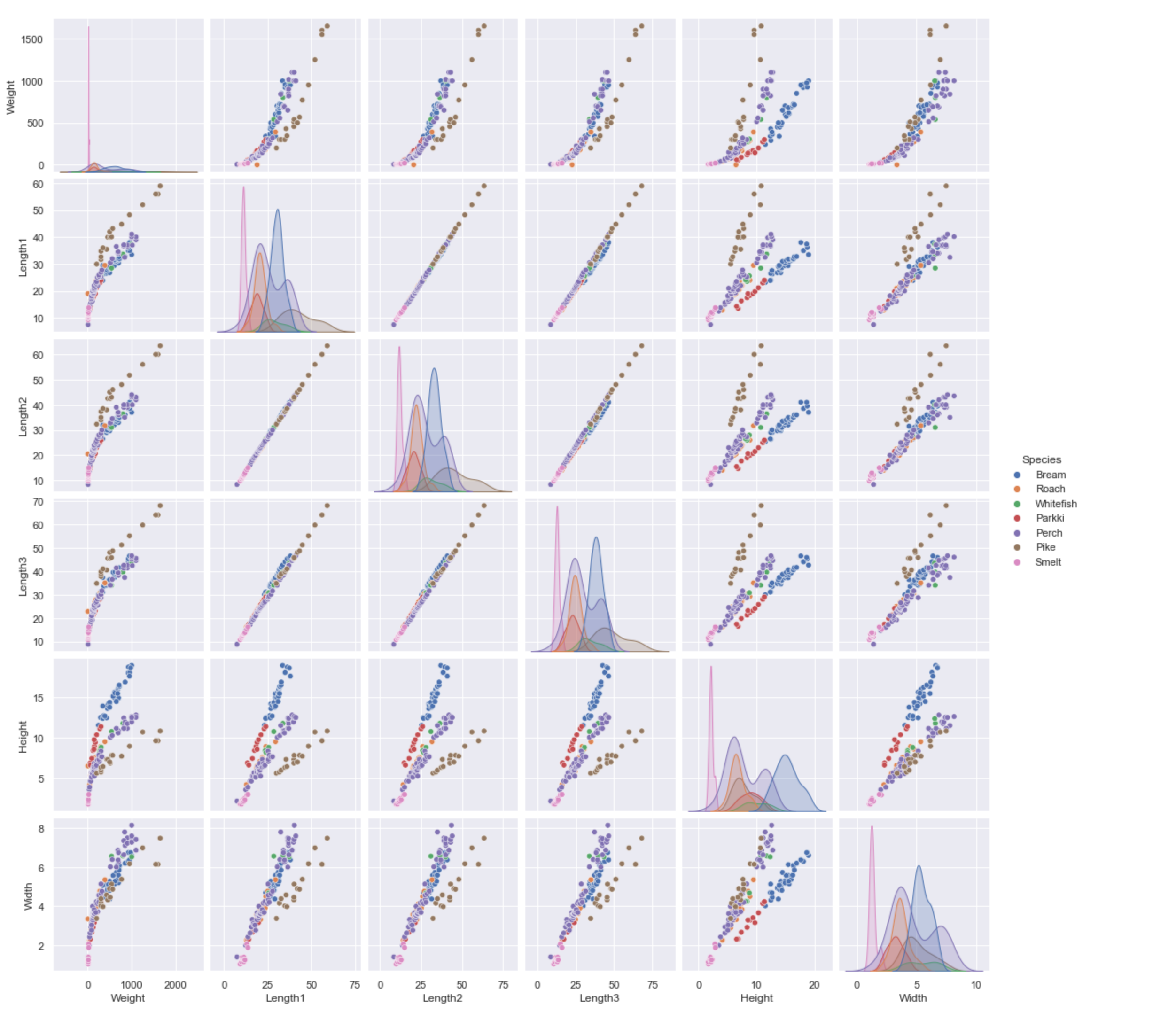
In [11]:
```
sns.pairplot(dataset)
```

Out[11]:
```
<seaborn.axisgrid.PairGrid at 0x29a8ba67f70>
```



In [12]:
```
sns.pairplot(dataset, hue = "Species")
```

Out[12]:
```
<seaborn.axisgrid.PairGrid at 0x29a8ccebd30>
```



3. Prepared Training and Test Dataset

Extract Independent and Dependent Variable

In [13]:
```
x = pd.DataFrame(dataset.iloc[:, 0])
y = pd.DataFrame(dataset.iloc[:, 1])
```

Encode Species Column

In [29]:
```
from sklearn.preprocessing import OneHotEncoder
```

In [30]:
```
onehot_encoder = OneHotEncoder()
x = pd.DataFrame(onehot_encoder.fit_transform(x).toarray())
```

Give Name The Column According Encoded Species Column

In [15]:
```
columns_name = dataset['Species'].sort_values().unique()
x.columns = columns_name
```

In [16]:
```
x = dataset.iloc[:, [5, 6]].join(x)
```

In [17]:
```
from sklearn.model_selection import train_test_split
```

In [20]:
```
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.2, random_state=0)
```

In [24]:
```
x_train
```

Out[24]:

	Height	Width	Bream	Parkki	Perch	Pike	Roach	Smelt	Whitefish
143	9.6000	6.1440	0.0	0.0	0.0	1.0	0.0	0.0	0.0
130	5.9364	4.3844	0.0	0.0	0.0	1.0	0.0	0.0	0.0
16	14.8604	5.2854	1.0	0.0	0.0	0.0	0.0	0.0	0.0
96	7.2930	3.7230	0.0	0.0	1.0	0.0	0.0	0.0	0.0
107	7.5852	4.6354	0.0	0.0	1.0	0.0	0.0	0.0	0.0
...	...	...	...	...	...	...	...	...	...
9	14.2266	4.9594	1.0	0.0	0.0	0.0	0.0	0.0	0.0
103	7.1672	4.3350	0.0	0.0	1.0	0.0	0.0	0.0	0.0
67	9.3960	3.4104	0.0	1.0	0.0	0.0	0.0	0.0	0.0
117	11.1366	6.0030	0.0	0.0	1.0	0.0	0.0	0.0	0.0
47	6.4000	3.8000	0.0	0.0	0.0	0.0	1.0	0.0	0.0

127 rows × 9 columns

In [25]:
```
y_train
```

Out[25]:

	Weight
143	1550.0
130	300.0
16	700.0
96	225.0
107	300.0
...	...
9	500.0
103	260.0
67	170.0
117	650.0
47	160.0

127 rows × 1 columns

In [26]:
```
x_test
```

Out[26]:

	Height	Width	Bream	Parkki	Perch	Pike	Roach	Smelt	Whitefish
7	12.6700	4.6900	1.0	0.0	0.0	0.0	0.0	0.0	0.0
40	6.4752	3.3516	0.0	0.0	0.0	0.0	1.0	0.0	0.0
95	6.2750	3.7250	0.0	0.0	1.0	0.0	0.0	0.0	0.0
45	7.0334	3.8203	0.0	0.0	0.0	0.0	1.0	0.0	0.0
110	10.2565	6.3875	0.0	0.0	1.0	0.0	0.0	0.0	0.0
120	11.7300	7.2250	0.0	0.0	1.0	0.0	0.0	0.0	0.0
59	11.7612	6.5736	0.0	0.0	0.0	0.0	0.0	0.0	1.0
131	6.2884	4.0198	0.0	0.0	0.0	1.0	0.0	0.0	0.0
33	18.6354	6.7473	1.0	0.0	0.0	0.0	0.0	0.0	0.0
83	5.9175	3.3075	0.0	0.0	1.0	0.0	0.0	0.0	0.0
128	5.5680	3.3756	0.0	0.0	0.0	1.0	0.0	0.0	0.0
134	7.2800	4.3225	0.0	0.0	0.0	1.0	0.0	0.0	0.0
60	12.3540	6.5250	0.0	0.0	0.0	0.0	0.0	0.0	1.0
126	12.6040	8.1420	0.0	0.0	1.0	0.0	0.0	0.0	0.0
62	6.5772	2.3142	0.0	1.0	0.0	0.0	0.0	0.0	0.0
37	5.5756	2.9044	0.0	0.0	0.0	0.0	1.0	0.0	0.0
44	6.6339	3.5478	0.0	0.0	0.0	0.0	1.0	0.0	0.0
142	9.6000	6.1440	0.0	0.0	0.0	1.0	0.0	0.0	0.0
85	6.3840	3.5340	0.0	0.0	1.0	0.0	0.0	0.0	0.0
26	16.3618	6.0900	1.0	0.0	0.0	0.0	0.0	0.0	0.0
61	6.8475	2.3265	0.0	1.0	0.0	0.0	0.0	0.0	0.0
54	9.4850	5.3550	0.0	0.0	0.0	0.0	1.0	0.0	0.0
86	6.1100	3.4075	0.0	0.0	1.0	0.0	0.0	0.0	0.0
144	10.8120	7.4800	0.0	0.0	0.0	1.0	0.0	0.0	0.0
63	7.4052	2.6730	0.0	1.0	0.0	0.0	0.0	0.0	0.0
8	14.0049	4.8438	1.0	0.0	0.0	0.0	0.0	0.0	0.0
24	16.2405	5.5890	1.0	0.0	0.0	0.0	0.0	0.0	0.0
56	8.1454	4.2485	0.0	0.0	0.0	0.0	0.0	0.0	1.0
119	11.9286	7.1064	0.0	0.0	1.0	0.0	0.0	0.0	0.0
148	2.1960	1.3800	0.0	0.0	0.0	0.0	0.0	1.0	0.0
19	14.4738	5.7276	1.0	0.0	0.0	0.0	0.0	0.0	0.0
90	5.5225	3.9950	0.0	0.0	1.0	0.0	0.0	0.0	0.0

In [27]:
```
y_test
```

Out[27]:

	Weight
7	390.0
40	0.0
95	170.0
45	160.0
110	556.0
120	900.0
59	800.0
131	300.0
33	975.0
83	115.0
128	200.0
134	456.0
60	1000.0
126	1000.0
62	60.0
37	78.0
44	145.0
142	1600.0
85	130.0
26	720.0
61	55.0
54	390.0
86	120.0
144	1650.0
63	90.0
8	450.0
24	700.0
56	270.0
119	850.0
148	9.7
19	650.0
90	110.0

In [22]:
```
dataset.shape
```

Out[22]:
```
(159, 7)
```

4. Predict Weight Fish each Species

In [28]:
```
from sklearn.linear_model import LinearRegression
```

In [31]:
```
model = LinearRegression()
model.fit(x_train, y_train)
```

Out[31]:
```
LinearRegression()
```

In [35]:
```
y_train_new = model.predict(x_train)
y_test_new = model.predict(x_test)
```

In [37]:
```
print(y_train_new)
```

```
[[ 8.93322440e+02]
 [ 4.87576814e+02]
 [ 5.83073318e+02]
 [ 2.69310925e+02]
 [ 3.58412774e+02]
 [ 6.32656063e+02]
 [ 7.41305095e+02]
 [ 1.47767616e+02]
 [ 6.44490083e+02]
 [-8.73130174e+01]
 [ 2.07541679e+02]
 [ 7.49672223e+02]
 [ 1.14934671e+02]
 [ 2.52001777e+02]
 [ 2.11077601e+02]
 [ 2.90819713e+02]
 [ 6.30226526e+02]
 [ 3.70716218e+02]
 [ 8.97777039e+02]
 [-1.41454561e+02]
 [ 1.03481600e+01]
 [ 3.52445538e+02]
 [ 5.62498085e+01]
 [ 1.03198354e+02]
 [ 3.64518650e+02]
 [ 5.24665995e+02]
 [-1.00363956e+01]
 [ 6.03827370e+02]
 [-3.02279814e+00]
 [-1.97054686e+01]
 [ 8.19040172e+01]
 [ 1.61384727e+02]
 [ 1.05655732e+02]
 [-4.55615768e+01]
 [ 1.03708648e+03]
 [ 9.34580485e+02]
 [ 7.72842643e+02]
 [ 2.50739549e+02]
 [ 2.59630151e+02]
 [ 2.24233411e+02]
 [ 4.32779641e+01]
 [ 9.23669370e+02]
 [ 3.44469239e+02]
 [ 2.45470855e+02]
 [ 1.77956819e+02]
 [ 2.39662003e+02]
 [ 4.95957465e+02]
 [ 6.63274637e+02]
 [ 6.91079489e+02]
 [ 8.85177853e+02]
 [ 6.24181392e+02]
 [ 6.48305643e+02]
 [ 6.72621431e+01]
 [ 3.89572240e+02]
 [ 7.77722050e+00]
 [ 3.61337637e+02]
 [ 1.05599956e+02]
 [ 5.60106537e+02]
 [ 5.31190545e+02]
 [ 1.62266066e+02]
 [-1.46661282e+01]
 [ 1.44470205e+02]
 [ 7.70874938e+02]
 [ 4.32562854e+02]
 [ 9.28016686e+02]
 [ 5.81743616e+02]
 [ 9.16006933e+02]
 [ 1.53609779e+02]
 [ 6.81900587e+02]
 [ 1.27890567e+02]
 [ 5.11576706e+02]
 [ 4.50967611e+02]
 [-1.31088559e+02]
 [ 2.97120175e+02]
 [ 1.04240962e+02]
 [ 2.28625093e+01]
 [ 1.08587192e+02]
 [ 3.31457954e+02]
 [ 4.53689638e+02]
 [-3.89382352e+01]
 [ 9.27822847e+01]
 [ 3.30510224e+02]
 [ 3.89622886e+02]
 [ 6.02408881e+02]
 [ 5.82468445e+02]
 [ 8.36416831e+02]
 [ 2.96074106e+02]
 [ 4.64098327e+01]
 [ 4.61843617e+02]
 [ 3.86615215e+02]
 [-1.01987889e+00]
 [ 8.80603102e+02]
 [ 2.38033988e+02]
 [ 8.71303156e+02]
 [ 8.03280426e+02]
 [ 2.35224456e+02]
 [ 7.23352687e+02]
 [ 9.00279913e+02]
 [ 4.92313965e+02]
 [ 9.45969472e+02]
 [ 6.92011175e+02]
 [ 9.84485783e+02]
 [ 9.89006213e+02]
 [ 2.02009177e+02]
 [ 1.36202293e+02]
 [ 9.48250934e+01]
 [ 7.10982257e+02]
 [ 6.39597798e+00]
 [-2.91744234e+02]
 [ 8.35788661e+01]
 [ 7.52649612e+02]
 [ 3.25938177e+01]
 [-2.70181314e+00]
 [ 7.64489234e+00]
 [ 1.21003742e+02]
 [ 5.83655369e+02]
 [ 8.44481476e+02]
 [ 1.65498977e+02]
 [ 3.36777593e+02]
 [ 1.30036255e+02]
 [-3.54224919e+00]
 [ 6.74823069e+02]
 [ 5.11292890e+02]
 [ 3.04796427e+02]
 [ 1.55197663e+02]
 [ 7.26883540e+02]
 [ 1.51481637e+02]]
```

In [36]:
```
print(y_test_new)
```

```
[[ 374.04448304]
 [ 124.20161475]
 [ 192.64716488]
 [ 200.76521194]
 [ 688.73559208]
 [ 861.46500412]
 [ 661.25826567]
 [ 487.34074648]
 [ 975.34563195]
 [ 134.98972265]
 [ 385.64079586]
 [ 584.4057373 ]
 [ 702.4148285 ]
 [ 994.8032406 ]
 [-138.05065158]
 [  23.45859006]
 [ 150.5951798 ]
 [ 893.32243996]
 [ 186.83442178]
 [ 755.48995246]
 [-116.75185579]
 [ 498.53381429]
 [ 156.86360258]
 [1082.95703181]
 [ -49.20677408]
 [ 486.06931087]
 [ 709.51778645]
 [ 217.55923904]
 [ 867.73367424]
 [  13.36427378]
 [ 586.40174702]
 [ 155.7120718 ]]
```

5. Plot with Scatter of Predict Result

In [38]:
```
plt.scatter(y_train, y_train_new)
plt.xlabel('Y Train')
plt.ylabel('Predicted Y')
plt.show()
```


End of Code