In [1]:
```
import pandas as pd
```

In [2]:
```
import numpy as np
```

In [4]:
```
df=pd.read_csv(r'https://github.com/YBIFoundation/Dataset/raw/main/Servo%20Mechanism.csv')
```

In [5]:
```
df.head()
```

Out[5]:

	Motor	Screw	Pgain	Vgain	Class
0	E	E	5	4	4
1	B	D	6	5	11
2	D	D	4	3	6
3	B	A	3	2	48
4	D	B	6	5	6

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 167 entries, 0 to 166
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype 
---  ------  --------------  ----- 
 0   Motor   167 non-null    object
 1   Screw   167 non-null    object
 2   Pgain   167 non-null    int64 
 3   Vgain   167 non-null    int64 
 4   Class   167 non-null    int64 
dtypes: int64(3), object(2)
memory usage: 6.6+ KB
```

In [7]:
```
df.describe()
```

Out[7]:

	Pgain	Vgain	Class
count	167.000000	167.000000	167.000000
mean	4.155689	2.538922	21.173653
std	1.017770	1.369850	13.908038
min	3.000000	1.000000	1.000000
25%	3.000000	1.000000	10.500000
50%	4.000000	2.000000	18.000000
75%	5.000000	4.000000	33.500000
max	6.000000	5.000000	51.000000

In [8]:
```
df.columns
```

Out[8]:
```
Index(['Motor', 'Screw', 'Pgain', 'Vgain', 'Class'], dtype='object')
```

In [9]:
```
df.shape
```

Out[9]:
```
(167, 5)
```

In [10]:
```
df[['Motor']].value_counts()
```

Out[10]:
```
Motor
C        40
A        36
B        36
E        33
D        22
dtype: int64
```

In [11]:
```
df[['Screw']].value_counts()
```

Out[11]:
```
Screw
A        42
B        35
C        31
D        30
E        29
dtype: int64
```

In [12]:
```
df.replace({'Motor':{'A':0,'B':1,'C':2,'D':3,'E':4}},inplace=True)
```

In [13]:
```
df.replace({'Screw':{'A':0,'B':1,'C':2,'D':3,'E':4}},inplace=True)
```

In [14]:
```
y=df['Class']
```

In [15]:
```
y.shape
```

Out[15]:
```
(167,)
```

In [16]:
```
y
```

Out[16]:
```
0       4
1      11
2       6
3      48
4       6
       ..
162    44
163    40
164    25
165    44
166    20
Name: Class, Length: 167, dtype: int64
```

In [17]:
```
x=df.drop('Class',axis=1)
```

In [18]:
```
x.shape
```

Out[18]:
```
(167, 4)
```

In [19]:
```
x
```

Out[19]:

	Motor	Screw	Pgain	Vgain
0	4	4	5	4
1	1	3	6	5
2	3	3	4	3
3	1	0	3	2
4	3	1	6	5
...	...	...	...	...
162	1	2	3	2
163	1	4	3	1
164	2	3	4	3
165	0	1	3	2
166	0	0	6	5

167 rows × 4 columns

In [21]:
```
from sklearn.model_selection import train_test_split
```

In [22]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state=2529)
```

In [23]:
```
x_train.shape,x_test.shape,y_train.shape,y_test.shape
```

Out[23]:
```
((116, 4), (51, 4), (116,), (51,))
```

In [24]:
```
from sklearn.linear_model import LinearRegression
```

In [25]:
```
lr=LinearRegression()
```

In [26]:
```
lr.fit(x_train,y_train)
```

Out[26]:
```
LinearRegression()
```

In [27]:
```
y_pred=lr.predict(x_test)
```

In [28]:
```
y_pred.shape
```

Out[28]:
```
(51,)
```

In [29]:
```
y_pred
```

Out[29]:
```
array([24.55945258, 30.98765106, 18.54485477, 25.51524243, 38.56082023,
       23.52007775, 11.61947065, 20.03335614, 40.60404401, 41.7009556 ,
       13.66269443, 26.01242807, 16.50163099, 16.54663453, 21.92598051,
       22.52570646, -5.46449561, 30.68912392, 32.7323477 ,  1.41282941,
       33.97718702, 31.63543611, 33.52806048, 30.04133887, 19.38557109,
        6.49364826, 28.5528375 , 17.04382017, 25.06611589,  3.50411229,
       30.59606128, 23.67067716, 35.72188367, 32.08456265, 12.46018697,
        3.6547117 , 23.47201865, 33.03807484, 17.49294672, 37.61458804,
       27.54898855, 22.07657992, 11.51387478,  9.470651  , 30.53852451,
       28.64590014, 33.67865989,  4.60102388, 24.1198037 , 21.13026773,
       25.71390094])
```

In [30]:
```
from sklearn.metrics import mean_squared_error,mean_absolute_error,r2_score
```

In [31]:
```
mean_squared_error(y_test,y_pred)
```

Out[31]:
```
66.03589175595566
```

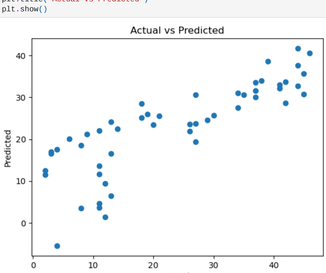
In [32]:
```
mean_absolute_error(y_test,y_pred)
```

Out[32]:
```
7.1905396772512375
```

In [33]:
```
r2_score(y_test,y_pred)
```

Out[33]:
```
0.6807245170563926
```

In [34]:
```
import matplotlib.pyplot as plt
plt.scatter(y_test,y_pred)
plt.xlabel("Actual")
plt.ylabel("Predicted")
plt.title("Actual vs Predicted")
plt.show()
```



In [35]:
```
x_new=df.sample(1)
```

In [36]:
```
x_new
```

Out[36]:

	Motor	Screw	Pgain	Vgain	Class
83	2	0	5	4	19

In [37]:
```
x_new.shape
```

Out[37]:
```
(1, 5)
```

In [38]:
```
x_new=x_new.drop('Class',axis=1)
```

In [39]:
```
x_new
```

Out[39]:

	Motor	Screw	Pgain	Vgain
83	2	0	5	4

In [40]:
```
x_new.shape
```

Out[40]:
```
(1, 4)
```

In [41]:
```
y_pred=lr.predict(x_new)
```

In [42]:
```
y_pred
```

Out[42]:
```
array([20.58807855])
```