In [54]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
#matplotlib inline

from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

In [84]:

Out[84]:
```
array([[5.1, 3.5, 1.4, 0.2],
       [4.9, 3. , 1.4, 0.2],
       [4.7, 3.2, 1.3, 0.2],
       [4.6, 3.1, 1.5, 0.2],
       [5. , 3.6, 1.4, 0.2],
       [5.4, 3.9, 1.7, 0.4],
       [4.6, 3.4, 1.4, 0.3],
       [5. , 3.4, 1.5, 0.2],
       [4.4, 2.9, 1.4, 0.2],
       [4.9, 3.1, 1.5, 0.1],
       [5.4, 3.7, 1.5, 0.2],
       [4.8, 3.4, 1.6, 0.2],
       [4.8, 3. , 1.4, 0.1],
       [4.3, 3. , 1.1, 0.1],
       [5.8, 4. , 1.2, 0.2],
       [5.7, 4.4, 1.5, 0.4],
       [5.4, 3.9, 1.3, 0.4],
       [5.1, 3.5, 1.4, 0.3],
       [5.7, 3.8, 1.7, 0.3],
       [5.1, 3.8, 1.5, 0.3],
       [5.4, 3.4, 1.7, 0.2],
       [5.1, 3.7, 1.5, 0.4],
       [4.6, 3.6, 1. , 0.2],
       [5.1, 3.3, 1.7, 0.5],
       [4.8, 3.4, 1.9, 0.2],
       [5. , 3. , 1.6, 0.2],
       [5. , 3.4, 1.6, 0.4],
       [5.2, 3.5, 1.5, 0.2],
       [5.2, 3.4, 1.4, 0.2],
       [4.7, 3.2, 1.6, 0.2],
       [4.8, 3.1, 1.6, 0.2],
       [5.4, 3.4, 1.5, 0.4],
       [5.2, 4.1, 1.5, 0.1],
       [5.5, 4.2, 1.4, 0.2],
       [4.9, 3.1, 1.5, 0.2],
       [5. , 3.2, 1.2, 0.2],
       [5.5, 3.5, 1.3, 0.2],
       [4.9, 3.6, 1.4, 0.1],
       [4.4, 3. , 1.3, 0.2],
       [5.1, 3.4, 1.5, 0.2],
       [5. , 3.5, 1.3, 0.3],
       [4.5, 2.3, 1.3, 0.3],
       [4.4, 3.2, 1.3, 0.2],
       [5. , 3.5, 1.6, 0.6],
       [5.1, 3.8, 1.9, 0.4],
       [4.8, 3. , 1.4, 0.3],
       [5.1, 3.8, 1.6, 0.2],
       [4.6, 3.2, 1.4, 0.2],
       [5.3, 3.7, 1.5, 0.2],
       [5. , 3.3, 1.4, 0.2],
       [7. , 3.2, 4.7, 1.4],
       [6.4, 3.2, 4.5, 1.5],
       [6.9, 3.1, 4.9, 1.5],
       [5.5, 2.3, 4. , 1.3],
       [6.5, 2.8, 4.6, 1.5],
       [5.7, 2.8, 4.5, 1.3],
       [6.3, 3.3, 4.7, 1.6],
       [4.9, 2.4, 3.3, 1. ],
       [6.6, 2.9, 4.6, 1.3],
       [5.2, 2.7, 3.9, 1.4],
       [5. , 2. , 3.5, 1. ],
       [5.9, 3. , 4.2, 1.5],
       [6. , 2.2, 4. , 1. ],
       [6.1, 2.9, 4.7, 1.4],
       [5.6, 2.9, 3.6, 1.3],
       [6.7, 3.1, 4.4, 1.4],
       [5.6, 3. , 4.5, 1.5],
       [5.8, 2.7, 4.1, 1. ],
       [6.2, 2.2, 4.5, 1.5],
       [5.6, 2.5, 3.9, 1.1],
       [5.9, 3.2, 4.8, 1.8],
       [6.1, 2.8, 4. , 1.3],
       [6.3, 2.5, 4.9, 1.5],
       [6.1, 2.8, 4.7, 1.2],
       [6.4, 2.9, 4.3, 1.3],
       [6.6, 3. , 4.4, 1.4],
       [6.8, 2.8, 4.8, 1.4],
       [6.7, 3. , 5. , 1.7],
       [6. , 2.9, 4.5, 1.5],
       [5.7, 2.6, 3.5, 1. ],
       [5.5, 2.4, 3.8, 1.1],
       [5.5, 2.4, 3.7, 1. ],
       [5.8, 2.7, 3.9, 1.2],
       [6. , 2.7, 5.1, 1.6],
       [5.4, 3. , 4.5, 1.5],
       [6. , 3.4, 4.5, 1.6],
       [6.7, 3.1, 4.7, 1.5],
       [6.3, 2.3, 4.4, 1.3],
       [5.6, 3. , 4.1, 1.3],
       [5.5, 2.5, 4. , 1.3],
       [5.5, 2.6, 4.4, 1.2],
       [6.1, 3. , 4.6, 1.4],
       [5.8, 2.6, 4. , 1.2],
       [5. , 2.3, 3.3, 1. ],
       [5.6, 2.7, 4.2, 1.3],
       [5.7, 3. , 4.2, 1.2],
       [5.7, 2.9, 4.2, 1.3],
       [6.2, 2.9, 4.3, 1.3],
       [5.1, 2.5, 3. , 1.1],
       [5.7, 2.8, 4.1, 1.3],
       [6.3, 3.3, 6. , 2.5],
       [5.8, 2.7, 5.1, 1.9],
       [7.1, 3. , 5.9, 2.1],
       [6.3, 2.9, 5.6, 1.8],
       [6.5, 3. , 5.8, 2.2],
       [7.6, 3. , 6.6, 2.1],
       [4.9, 2.5, 4.5, 1.7],
       [7.3, 2.9, 6.3, 1.8],
       [6.7, 2.5, 5.8, 1.8],
       [7.2, 3.6, 6.1, 2.5],
       [6.5, 3.2, 5.1, 2. ],
       [6.4, 2.7, 5.3, 1.9],
       [6.8, 3. , 5.5, 2.1],
       [5.7, 2.5, 5. , 2. ],
       [5.8, 2.8, 5.1, 2.4],
       [6.4, 3.2, 5.3, 2.3],
       [6.5, 3. , 5.5, 1.8],
       [7.7, 3.8, 6.7, 2.2],
       [7.7, 2.6, 6.9, 2.3],
       [6. , 2.2, 5. , 1.5],
       [6.9, 3.2, 5.7, 2.3],
       [5.6, 2.8, 4.9, 2. ],
       [7.7, 2.8, 6.7, 2. ],
       [6.3, 2.7, 4.9, 1.8],
       [6.7, 3.3, 5.7, 2.1],
       [7.2, 3.2, 6. , 1.8],
       [6.2, 2.8, 4.8, 1.8],
       [6.1, 3. , 4.9, 1.8],
       [6.4, 2.8, 5.6, 2.1],
       [7.2, 3. , 5.8, 1.6],
       [7.4, 2.8, 6.1, 1.9],
       [7.9, 3.8, 6.4, 2. ],
       [6.4, 2.8, 5.6, 2.2],
       [6.3, 2.8, 5.1, 1.5],
       [6.1, 2.6, 5.6, 1.4],
       [7.7, 3. , 6.1, 2.3],
       [6.3, 3.4, 5.6, 2.4],
       [6.4, 3.1, 5.5, 1.8],
       [6. , 3. , 4.8, 1.8],
       [6.9, 3.1, 5.4, 2.1],
       [6.7, 3.1, 5.6, 2.4],
       [6.9, 3.1, 5.1, 2.3],
       [5.8, 2.7, 5.1, 1.9],
       [6.8, 3.2, 5.9, 2.3],
       [6.7, 3.3, 5.7, 2.5],
       [6.7, 3. , 5.2, 2.3],
       [6.3, 2.5, 5. , 1.9],
       [6.5, 3. , 5.2, 2. ],
       [6.2, 3.4, 5.4, 2.3],
       [5.9, 3. , 5.1, 1.8]])
```

In [107…
```python
#convert to dataFrame
df = pd.DataFrame(data=iris_dataset.data)
df
```

Out[107…

	0	1	2	3
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2
...	...	...	...	...
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

150 rows × 4 columns

In [108…
```python
df.head()
```

Out[108…

	0	1	2	3
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2

In [39]:
```python
df.tail()
```

Out[39]:

	0	1	2	3
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

In [109…
```python
df.columns = ['A', 'B', 'C', 'D']
df
```

Out[109…

	A	B	C	D
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2
...	...	...	...	...
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

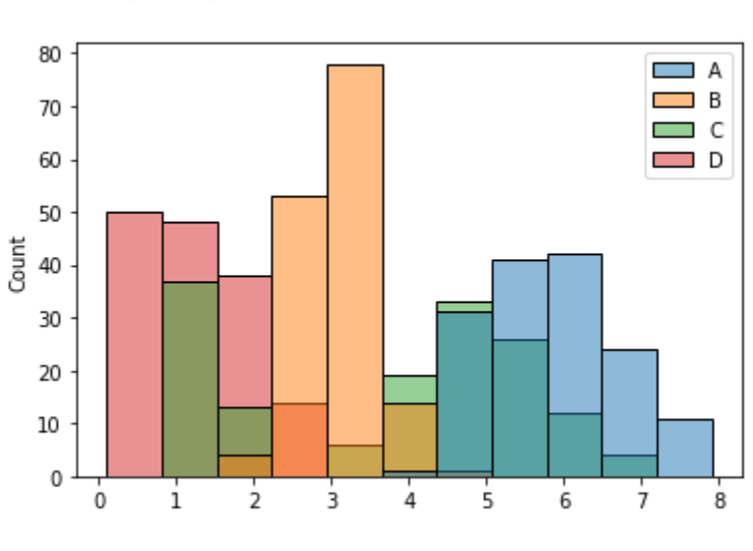
150 rows × 4 columns

In [52]:
```python
df.index
```

Out[52]: RangeIndex(start=0, stop=150, step=1)

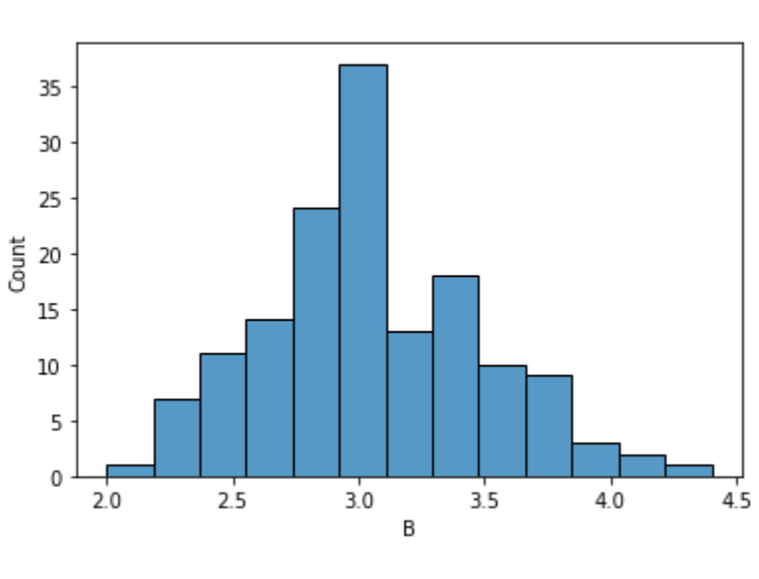
In [55]:
```python
sns.histplot(df)
```

Out[55]: <AxesSubplot:ylabel='Count'>



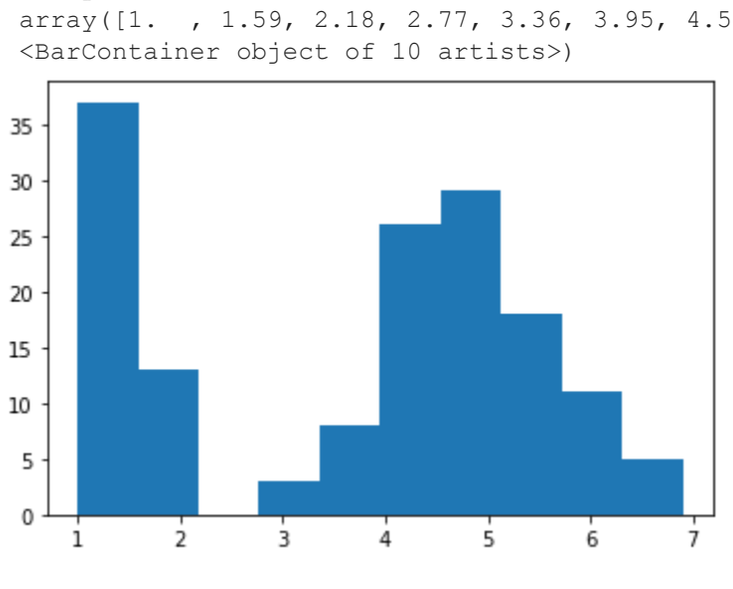
In [57]:
```python
sns.histplot(df.B)
```

Out[57]: <AxesSubplot:xlabel='B', ylabel='Count'>



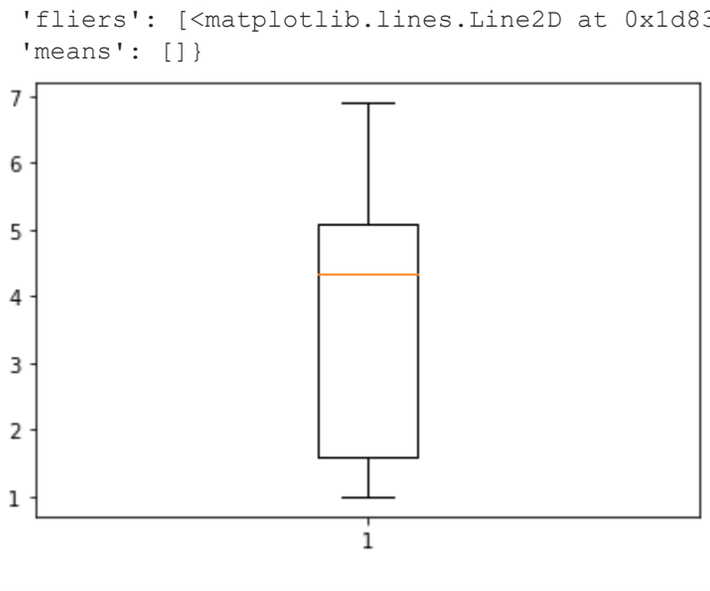
In [59]:
```python
plt.hist(df['C'])
```

Out[59]:
```
(array([37., 13.,  0.,  3.,  8., 26., 29., 18., 11.,  5.]),
 array([1.  , 1.59, 2.18, 2.77, 3.36, 3.95, 4.54, 5.13, 5.72, 6.31, 6.9 ]),
 <BarContainer object of 10 artists>)
```



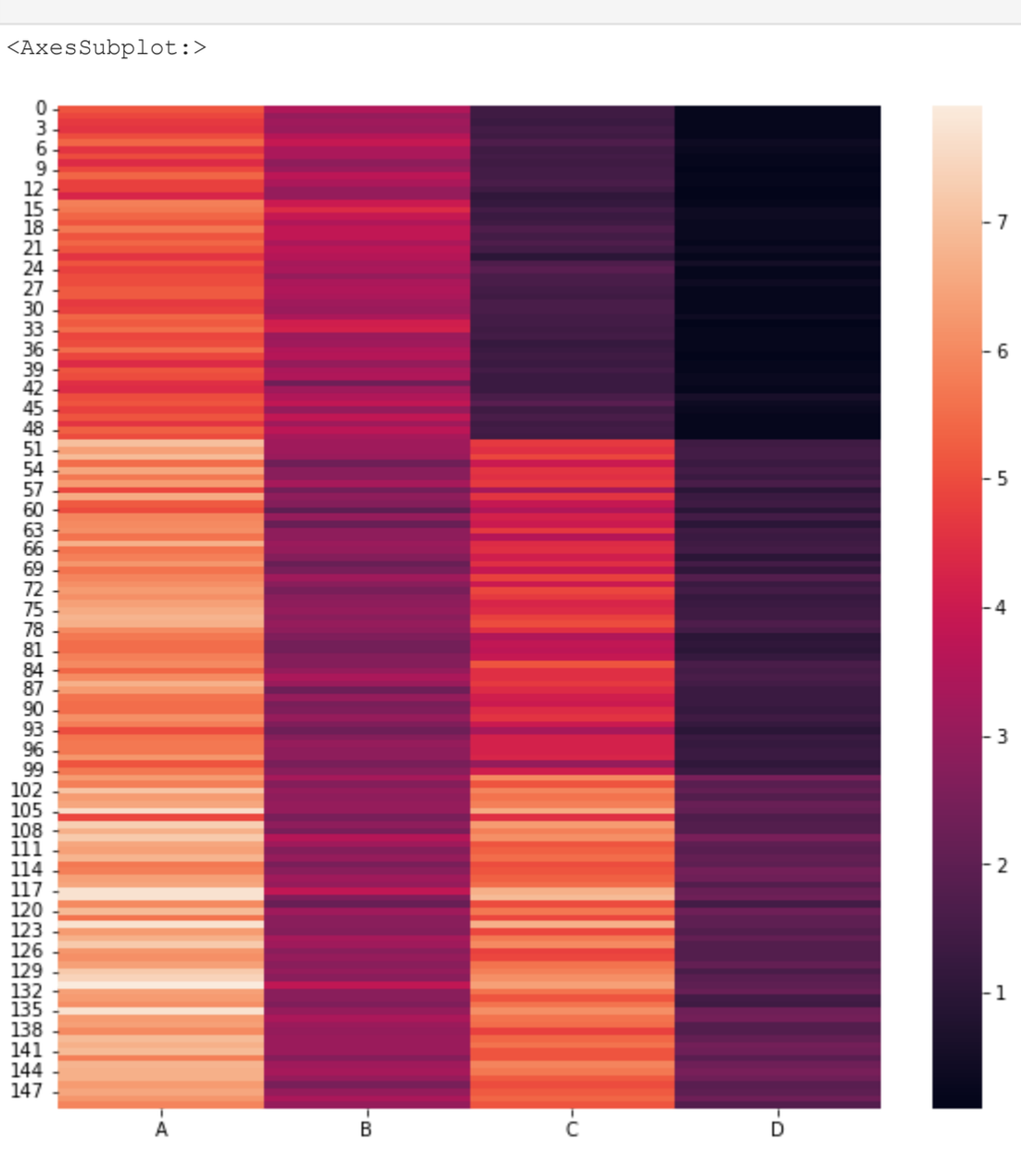
In [60]:
```python
plt.boxplot(df.C)
```

Out[60]:
```
{'whiskers': [<matplotlib.lines.Line2D at 0x1d83ae88e20>,
  <matplotlib.lines.Line2D at 0x1d83969e850>],
 'caps': [<matplotlib.lines.Line2D at 0x1d83969e340>,
  <matplotlib.lines.Line2D at 0x1d83a582f40>],
 'boxes': [<matplotlib.lines.Line2D at 0x1d83ae88bb0>],
 'medians': [<matplotlib.lines.Line2D at 0x1d83a582370>],
 'fliers': [<matplotlib.lines.Line2D at 0x1d83a582c70>],
 'means': []}
```



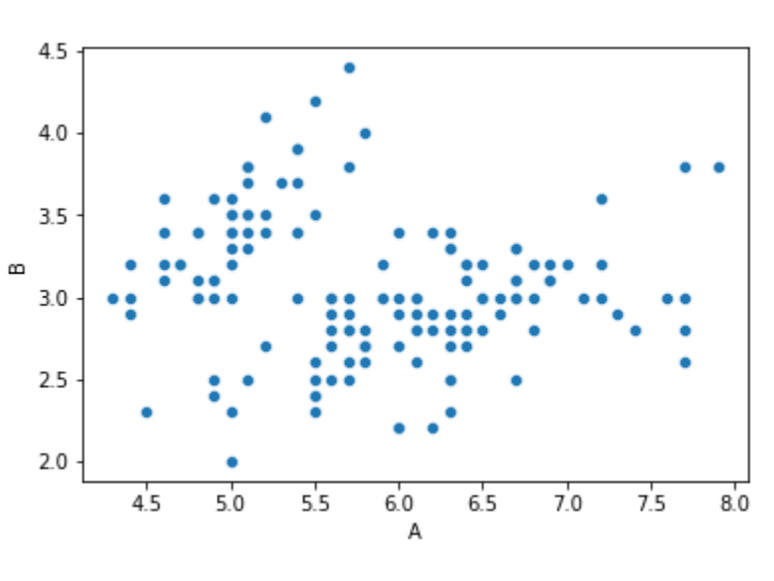
In [66]:
```python
plt.figure(figsize=(10, 10))
sns.heatmap(df, annot=False)
```

Out[66]: <AxesSubplot:>



In [104…
```python
sns.scatterplot(x=df.A, y=df.B)
```

Out[104… <AxesSubplot:xlabel='A', ylabel='B'>



In [116…
```python
X =df.drop(columns=['D'])
y = df['D']
```

In [150…
```python
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3)
```

In [158…
```python
y_test
```

Out[158…
```
146    1.9
149    1.8
111    1.9
30     0.2
104    2.2
144    2.5
1      0.2
36     0.2
14     0.2
112    2.1
117    2.2
40     0.3
47     0.2
141    2.3
63     1.4
11     0.2
31     0.4
92     1.2
95     1.2
0      0.2
121    2.0
78     1.5
147    2.0
133    1.5
62     1.0
145    2.3
38     0.2
82     1.2
61     1.5
55     1.3
22     0.2
130    1.9
53     1.3
148    2.3
137    1.8
21     0.4
126    1.8
140    2.4
115    2.3
39     0.2
76     1.4
41     0.3
73     1.2
143    2.3
87     1.3
Name: D, dtype: float64
```

KNN Regressor

In [163…
```python
from sklearn.neighbors import KNeighborsRegressor

knn = KNeighborsRegressor()
knn.fit(X_train, y_train)
```

Out[163… KNeighborsRegressor()

In [165…
```python
y_pred = knn.predict(X_test)
```

In [170…
```python
y_pred.shape
```

Out[170… (45,)

In [171…
```python
y_train.shape
y_test.shape
```

Out[171… (45,)

In [174…
```python
from sklearn.metrics import mean_absolute_error
acrr = mean_absolute_error(y_test, y_pred)
acrr
```

Out[174… 0.1551111111111111

In [183…
```python
from sklearn import datasets

df = datasets.load_iris()

df = pd.DataFrame(data=df.data)
```

In [189…
```python
df.columns = ['a', 'b', 'c', 'd']
df.shape
df.index
df.columns
```

Out[189… Index(['a', 'b', 'c', 'd'], dtype='object')

In [198…
```python
df.loc[:  ,'a' ]
df
```

Out[198…

	a	b	c	d
0	5.1	3.5	1.4	0.2
1	4.9	3.0	1.4	0.2
2	4.7	3.2	1.3	0.2
3	4.6	3.1	1.5	0.2
4	5.0	3.6	1.4	0.2
...	...	...	...	...
145	6.7	3.0	5.2	2.3
146	6.3	2.5	5.0	1.9
147	6.5	3.0	5.2	2.0
148	6.2	3.4	5.4	2.3
149	5.9	3.0	5.1	1.8

150 rows × 4 columns

In [207…
```python
x = df.iloc[: , :-1]
y = df.iloc[: , -1]
from sklearn.model_selection import train_test_split

x_tr, x_te, y_tr, y_te = train_test_split(x, y)
```

In [208…
```python
x_tr
```

Out[208…

	a	b	c
90	5.5	2.6	4.4
34	4.9	3.1	1.5
106	4.9	2.5	4.5
55	5.7	2.8	4.5
96	5.7	2.9	4.2
...	...	...	...
32	5.2	4.1	1.5
75	6.6	3.0	4.4
35	5.0	3.2	1.2
9	4.9	3.1	1.5
125	7.2	3.2	6.0

112 rows × 3 columns

Linear Regression

In [213…
```python
from sklearn.linear_model import LinearRegression

lr = LinearRegression()
lr.fit(x_tr, y_tr)
y_pr=lr.predict(x_te)
y_pr
```

Out[213…
```
array([1.75817343, 0.27559847, 1.02304746, 0.14855876, 1.64270853,
       1.8088459 , 0.30094101, 2.04665424, 1.51746774, 1.84794356,
       0.24157648, 0.31469613, 2.01226743, 1.35495737, 1.80378283,
       1.82260102, 1.73645789, 1.11135631, 2.0647534 , 0.14819195,
       1.37232688, 0.28030932, 0.30492221, 1.44979057, 0.21696557,
       0.04358483, 0.29406444, 0.15398665, 1.49720087, 0.23398287,
       1.32816615, 1.1298203 , 0.1662931 , 0.21841425, 1.2836532 ,
       0.18547611, 1.64705258, 0.29224895])
```

In [216…
```python
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score
mse = mean_absolute_error(y_te, y_pr)
mse*100
```

Out[216… 11.295066010419927

In [219…
```python
mae = mean_squared_error(y_te, y_pr)
mae*100
```

Out[219… 2.072481352442615

SVR

In [222…
```python
from sklearn.svm import SVR

svr = SVR()
svr.fit(x_tr, y_tr)
svr1= svr.predict(x_te)
svr1
```

Out[222…
```
array([1.81260934, 0.32631443, 1.0876026 , 0.24130479, 1.65439047,
       1.89879133, 0.22706761, 2.11215326, 1.58169124, 1.8528243 ,
       0.28376158, 0.24067514, 2.11452663, 1.31537502, 1.82745983,
       1.86937525, 1.78745846, 1.13537161, 2.1731173 , 0.23622959,
       1.3757722 , 0.22514937, 0.27920421, 1.40346811, 0.2358552 ,
       0.24633838, 0.24549112, 0.19210746, 1.53383503, 0.21549048,
       1.3423918 , 1.05725079, 0.21676422, 0.23260624, 1.25357179,
       0.21236111, 1.70371203, 0.34830935])
```

In [224…
```python
svr_mse = mean_absolute_error(y_te, svr1)
svr_mse
```

Out[224… 0.1208165623964546