In [1]:
```
import numpy as np
import pandas as pd
from matplotlib import pyplot as plt
from sklearn import datasets
from sklearn import svm
from sklearn.model_selection import train_test_split
```

In [4]:
```
df = pd.read_csv( "C:\\Users\\ADMIN\\Desktop\\chinni\\iris.data.csv", names=['a', 'a1', 'b', 'b1', 'class'])
```

In [5]:
```
df
```

Out[5]:

	a	a1	b	b1	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 5 columns

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   a       150 non-null    float64
 1   a1      150 non-null    float64
 2   b       150 non-null    float64
 3   b1      150 non-null    float64
 4   class   150 non-null    object 
dtypes: float64(4), object(1)
memory usage: 6.0+ KB
```

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

Out[7]:

	a	a1	b	b1	class
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [8]:
```
df.tail()
```

Out[8]:

	a	a1	b	b1	class
145	6.7	3.0	5.2	2.3	Iris-virginica
146	6.3	2.5	5.0	1.9	Iris-virginica
147	6.5	3.0	5.2	2.0	Iris-virginica
148	6.2	3.4	5.4	2.3	Iris-virginica
149	5.9	3.0	5.1	1.8	Iris-virginica

In [9]:
```
features = df.iloc[:, :-1].values
labels = df.iloc[:, -1].values
```

In [10]:
```
features
```

Out[10]:
```
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, 0.1],
       [5. , 3.2, 1.2, 0.2],
       [5.5, 3.5, 1.3, 0.2],
       [4.9, 3.1, 1.5, 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 [11]:

```
labels
```

Out[11]:

```
array(['Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
```

```
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-setosa', 'Iris-setosa', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica'], dtype=object)
```

In [12]:

```
x_train, x_test, y_train, y_test = train_test_split(features, labels,test_size=0.3,random_state=0)
```

In [13]:

```
x_train,x_test,y_train,y_test
```

Out[13]:

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

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

```
       [5. , 2.3, 3.3, 1. ],
       [5. , 3.4, 1.6, 0.4],
       [6.4, 3.1, 5.5, 1.8],
       [5.4, 3. , 4.5, 1.5],
       [5.2, 3.5, 1.5, 0.2],
       [6.1, 3. , 4.9, 1.8],
       [6.4, 2.8, 5.6, 2.2],
       [5.2, 2.7, 3.9, 1.4],
       [5.7, 3.8, 1.7, 0.3],
       [6. , 2.7, 5.1, 1.6],
       [5.9, 3. , 4.2, 1.5],
       [5.8, 2.6, 4. , 1.2],
       [6.8, 3. , 5.5, 2.1],
       [4.7, 3.2, 1.3, 0.2],
       [6.9, 3.1, 5.1, 2.3],
       [5. , 3.5, 1.6, 0.6],
       [5.4, 3.7, 1.5, 0.2]]),
array(['Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-virginica', 'Iris-versicolor',
       'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-versicolor', 'Iris-virginica',
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-virginica', 'Iris-virginica', 'Iris-virginica',
       'Iris-virginica', 'Iris-setosa', 'Iris-setosa', 'Iris-virginica',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-virginica', 'Iris-virginica', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-versicolor', 'Iris-virginica', 'Iris-virginica',
       'Iris-setosa', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
       'Iris-setosa', 'Iris-virginica', 'Iris-versicolor',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-setosa', 'Iris-virginica', 'Iris-setosa', 'Iris-virginica',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-virginica', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-versicolor',
       'Iris-virginica', 'Iris-virginica', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-versicolor', 'Iris-virginica',
       'Iris-setosa'], dtype=object),
array(['Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-setosa'], dtype=object))
```

In [14]:
```
x_train.shape, x_test.shape, y_train.shape, y_test.shape
```

Out[14]:
```
((105, 4), (45, 4), (105,), (45,))
```

In [15]:
```
C=1
svc = svm.SVC(kernel='linear',C=1)
svc.fit(features,labels)
y_pred = svc.predict(x_test)
y_pred
```

Out[15]:
```
array(['Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa',
       'Iris-versicolor', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa', 'Iris-setosa',
       'Iris-virginica', 'Iris-setosa', 'Iris-setosa', 'Iris-versicolor',
```

```
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-versicolor', 'Iris-setosa', 'Iris-virginica',
       'Iris-virginica', 'Iris-versicolor', 'Iris-setosa',
       'Iris-virginica', 'Iris-versicolor', 'Iris-versicolor',
       'Iris-virginica', 'Iris-setosa', 'Iris-virginica', 'Iris-setosa',
       'Iris-setosa'], dtype=object)
```

In [16]:
```
y_pred.shape
```

Out[16]:
```
(45,)
```

In [17]:
```
## Accuracy

from sklearn.metrics import accuracy_score
accuracy_score(y_test,y_pred)
```

Out[17]:
```
0.9777777777777777
```

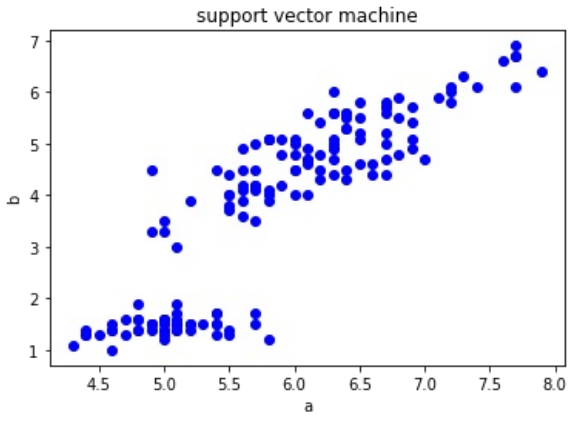
In [18]:
```
## Classification Report

from sklearn.metrics import classification_report
print(classification_report(y_test,y_pred))
```

```
                precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00        16
Iris-versicolor       1.00      0.94      0.97        18
 Iris-virginica       0.92      1.00      0.96        11

       accuracy                           0.98        45
      macro avg       0.97      0.98      0.98        45
   weighted avg       0.98      0.98      0.98        45
```

In [20]:
```
from sklearn.metrics import confusion_matrix
cm= confusion_matrix(y_test,y_pred)
cm
```

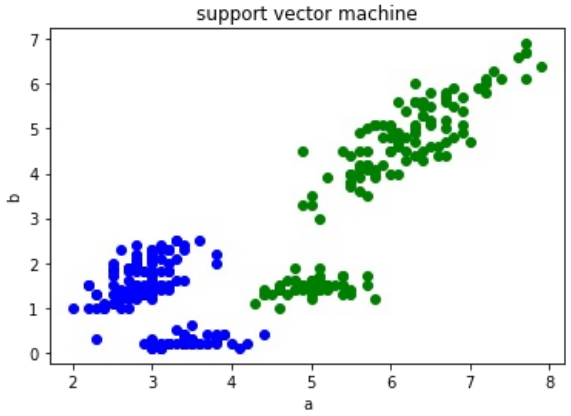
Out[20]:
```
array([[16,  0,  0],
       [ 0, 17,  1],
       [ 0,  0, 11]], dtype=int64)
```

In [23]:
```
## Visualization
import matplotlib
from matplotlib import pyplot as plt
x=df['a']
y=df['b']
plt.scatter(x,y,color='b' )
plt.xlabel('a')
plt.ylabel('b')
plt.title("support vector machine")
plt.show()
```



In [24]:

```
import matplotlib
from matplotlib import pyplot as plt
x=df['a']
y=df['b']
x1=df['a1']
y1=df['b1']
plt.scatter(x,y,color='g' )
plt.scatter(x1,y1,color='b' )
plt.xlabel('a')
plt.ylabel('b')
plt.title("support vector machine")
plt.show()
```



In [ ]: