In [3]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
from sklearn.datasets import load_iris
```

In [13]:

```
iris=load_iris()
```

In [14]:

```
load_iris
```

Out[14]:

```
<function sklearn.datasets._base.load_iris(*, return_X_y=False, as_frame=F
alse)>
```

In [15]:

```
iris.feature_names
```

Out[15]:

```
['sepal length (cm)',
 'sepal width (cm)',
 'petal length (cm)',
 'petal width (cm)']
```

In [16]:

```
iris.target
```

Out[16]:

```
array([0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2])
```

In [21]:

```
iris.target_names
```

Out[21]:

```
array(['setosa', 'versicolor', 'virginica'], dtype='<U10')
```

In [23]:

```
df=pd.DataFrame(iris.data, columns=iris.feature_names)
df.head()
```

Out[23]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)
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 [24]:

```
df['target']=iris.target
df.head()
```

Out[24]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

In [27]:

```
df['target names']=df.target.apply(lambda x: iris.target_names[x])
df.head()
```

Out[27]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
0	5.1	3.5	1.4	0.2	0	setosa
1	4.9	3.0	1.4	0.2	0	setosa
2	4.7	3.2	1.3	0.2	0	setosa
3	4.6	3.1	1.5	0.2	0	setosa
4	5.0	3.6	1.4	0.2	0	setosa

In [28]:

```
df[df['target']==0]
```

Out[28]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
0	5.1	3.5	1.4	0.2	0	setosa
1	4.9	3.0	1.4	0.2	0	setosa
2	4.7	3.2	1.3	0.2	0	setosa
3	4.6	3.1	1.5	0.2	0	setosa
4	5.0	3.6	1.4	0.2	0	setosa
5	5.4	3.9	1.7	0.4	0	setosa
6	4.6	3.4	1.4	0.3	0	setosa
7	5.0	3.4	1.5	0.2	0	setosa
8	4.4	2.9	1.4	0.2	0	setosa
9	4.9	3.1	1.5	0.1	0	setosa
10	5.4	3.7	1.5	0.2	0	setosa
11	4.8	3.4	1.6	0.2	0	setosa
12	4.8	3.0	1.4	0.1	0	setosa
13	4.3	3.0	1.1	0.1	0	setosa
14	5.8	4.0	1.2	0.2	0	setosa
15	5.7	4.4	1.5	0.4	0	setosa
16	5.4	3.9	1.3	0.4	0	setosa
17	5.1	3.5	1.4	0.3	0	setosa
18	5.7	3.8	1.7	0.3	0	setosa
19	5.1	3.8	1.5	0.3	0	setosa
20	5.4	3.4	1.7	0.2	0	setosa
21	5.1	3.7	1.5	0.4	0	setosa
22	4.6	3.6	1.0	0.2	0	setosa
23	5.1	3.3	1.7	0.5	0	setosa
24	4.8	3.4	1.9	0.2	0	setosa
25	5.0	3.0	1.6	0.2	0	setosa
26	5.0	3.4	1.6	0.4	0	setosa
27	5.2	3.5	1.5	0.2	0	setosa
28	5.2	3.4	1.4	0.2	0	setosa
29	4.7	3.2	1.6	0.2	0	setosa
30	4.8	3.1	1.6	0.2	0	setosa
31	5.4	3.4	1.5	0.4	0	setosa
32	5.2	4.1	1.5	0.1	0	setosa
33	5.5	4.2	1.4	0.2	0	setosa
34	4.9	3.1	1.5	0.2	0	setosa
35	5.0	3.2	1.2	0.2	0	setosa

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
36	5.5	3.5	1.3	0.2	0	setosa
37	4.9	3.6	1.4	0.1	0	setosa
38	4.4	3.0	1.3	0.2	0	setosa
39	5.1	3.4	1.5	0.2	0	setosa
40	5.0	3.5	1.3	0.3	0	setosa
41	4.5	2.3	1.3	0.3	0	setosa
42	4.4	3.2	1.3	0.2	0	setosa
43	5.0	3.5	1.6	0.6	0	setosa
44	5.1	3.8	1.9	0.4	0	setosa
45	4.8	3.0	1.4	0.3	0	setosa
46	5.1	3.8	1.6	0.2	0	setosa
47	4.6	3.2	1.4	0.2	0	setosa
48	5.3	3.7	1.5	0.2	0	setosa
49	5.0	3.3	1.4	0.2	0	setosa

In [29]:

```
df[df['target']==1]
```

Out[29]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
50	7.0	3.2	4.7	1.4	1	versicolor
51	6.4	3.2	4.5	1.5	1	versicolor
52	6.9	3.1	4.9	1.5	1	versicolor
53	5.5	2.3	4.0	1.3	1	versicolor
54	6.5	2.8	4.6	1.5	1	versicolor
55	5.7	2.8	4.5	1.3	1	versicolor
56	6.3	3.3	4.7	1.6	1	versicolor
57	4.9	2.4	3.3	1.0	1	versicolor
58	6.6	2.9	4.6	1.3	1	versicolor
59	5.2	2.7	3.9	1.4	1	versicolor
60	5.0	2.0	3.5	1.0	1	versicolor
61	5.9	3.0	4.2	1.5	1	versicolor
62	6.0	2.2	4.0	1.0	1	versicolor
63	6.1	2.9	4.7	1.4	1	versicolor
64	5.6	2.9	3.6	1.3	1	versicolor
65	6.7	3.1	4.4	1.4	1	versicolor
66	5.6	3.0	4.5	1.5	1	versicolor
67	5.8	2.7	4.1	1.0	1	versicolor
68	6.2	2.2	4.5	1.5	1	versicolor
69	5.6	2.5	3.9	1.1	1	versicolor
70	5.9	3.2	4.8	1.8	1	versicolor
71	6.1	2.8	4.0	1.3	1	versicolor
72	6.3	2.5	4.9	1.5	1	versicolor
73	6.1	2.8	4.7	1.2	1	versicolor
74	6.4	2.9	4.3	1.3	1	versicolor
75	6.6	3.0	4.4	1.4	1	versicolor
76	6.8	2.8	4.8	1.4	1	versicolor
77	6.7	3.0	5.0	1.7	1	versicolor
78	6.0	2.9	4.5	1.5	1	versicolor
79	5.7	2.6	3.5	1.0	1	versicolor
80	5.5	2.4	3.8	1.1	1	versicolor
81	5.5	2.4	3.7	1.0	1	versicolor
82	5.8	2.7	3.9	1.2	1	versicolor
83	6.0	2.7	5.1	1.6	1	versicolor
84	5.4	3.0	4.5	1.5	1	versicolor
85	6.0	3.4	4.5	1.6	1	versicolor

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
86	6.7	3.1	4.7	1.5	1	versicolor
87	6.3	2.3	4.4	1.3	1	versicolor
88	5.6	3.0	4.1	1.3	1	versicolor
89	5.5	2.5	4.0	1.3	1	versicolor
90	5.5	2.6	4.4	1.2	1	versicolor
91	6.1	3.0	4.6	1.4	1	versicolor
92	5.8	2.6	4.0	1.2	1	versicolor
93	5.0	2.3	3.3	1.0	1	versicolor
94	5.6	2.7	4.2	1.3	1	versicolor
95	5.7	3.0	4.2	1.2	1	versicolor
96	5.7	2.9	4.2	1.3	1	versicolor
97	6.2	2.9	4.3	1.3	1	versicolor
98	5.1	2.5	3.0	1.1	1	versicolor
99	5.7	2.8	4.1	1.3	1	versicolor

In [30]:

```
df[df['target']==2]
```

Out[30]:

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
100	6.3	3.3	6.0	2.5	2	virginica
101	5.8	2.7	5.1	1.9	2	virginica
102	7.1	3.0	5.9	2.1	2	virginica
103	6.3	2.9	5.6	1.8	2	virginica
104	6.5	3.0	5.8	2.2	2	virginica
105	7.6	3.0	6.6	2.1	2	virginica
106	4.9	2.5	4.5	1.7	2	virginica
107	7.3	2.9	6.3	1.8	2	virginica
108	6.7	2.5	5.8	1.8	2	virginica
109	7.2	3.6	6.1	2.5	2	virginica
110	6.5	3.2	5.1	2.0	2	virginica
111	6.4	2.7	5.3	1.9	2	virginica
112	6.8	3.0	5.5	2.1	2	virginica
113	5.7	2.5	5.0	2.0	2	virginica
114	5.8	2.8	5.1	2.4	2	virginica
115	6.4	3.2	5.3	2.3	2	virginica
116	6.5	3.0	5.5	1.8	2	virginica
117	7.7	3.8	6.7	2.2	2	virginica
118	7.7	2.6	6.9	2.3	2	virginica
119	6.0	2.2	5.0	1.5	2	virginica
120	6.9	3.2	5.7	2.3	2	virginica
121	5.6	2.8	4.9	2.0	2	virginica
122	7.7	2.8	6.7	2.0	2	virginica
123	6.3	2.7	4.9	1.8	2	virginica
124	6.7	3.3	5.7	2.1	2	virginica
125	7.2	3.2	6.0	1.8	2	virginica
126	6.2	2.8	4.8	1.8	2	virginica
127	6.1	3.0	4.9	1.8	2	virginica
128	6.4	2.8	5.6	2.1	2	virginica
129	7.2	3.0	5.8	1.6	2	virginica
130	7.4	2.8	6.1	1.9	2	virginica
131	7.9	3.8	6.4	2.0	2	virginica
132	6.4	2.8	5.6	2.2	2	virginica
133	6.3	2.8	5.1	1.5	2	virginica
134	6.1	2.6	5.6	1.4	2	virginica
135	7.7	3.0	6.1	2.3	2	virginica

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	target names
136	6.3	3.4	5.6	2.4	2	virginica
137	6.4	3.1	5.5	1.8	2	virginica
138	6.0	3.0	4.8	1.8	2	virginica
139	6.9	3.1	5.4	2.1	2	virginica
140	6.7	3.1	5.6	2.4	2	virginica
141	6.9	3.1	5.1	2.3	2	virginica
142	5.8	2.7	5.1	1.9	2	virginica
143	6.8	3.2	5.9	2.3	2	virginica
144	6.7	3.3	5.7	2.5	2	virginica
145	6.7	3.0	5.2	2.3	2	virginica
146	6.3	2.5	5.0	1.9	2	virginica
147	6.5	3.0	5.2	2.0	2	virginica
148	6.2	3.4	5.4	2.3	2	virginica
149	5.9	3.0	5.1	1.8	2	virginica

In [40]:

```
df0=df[:50]
df1=df[50:100]
df2=df[100:150]
```

Plot Sepal length Vs Sepal Width

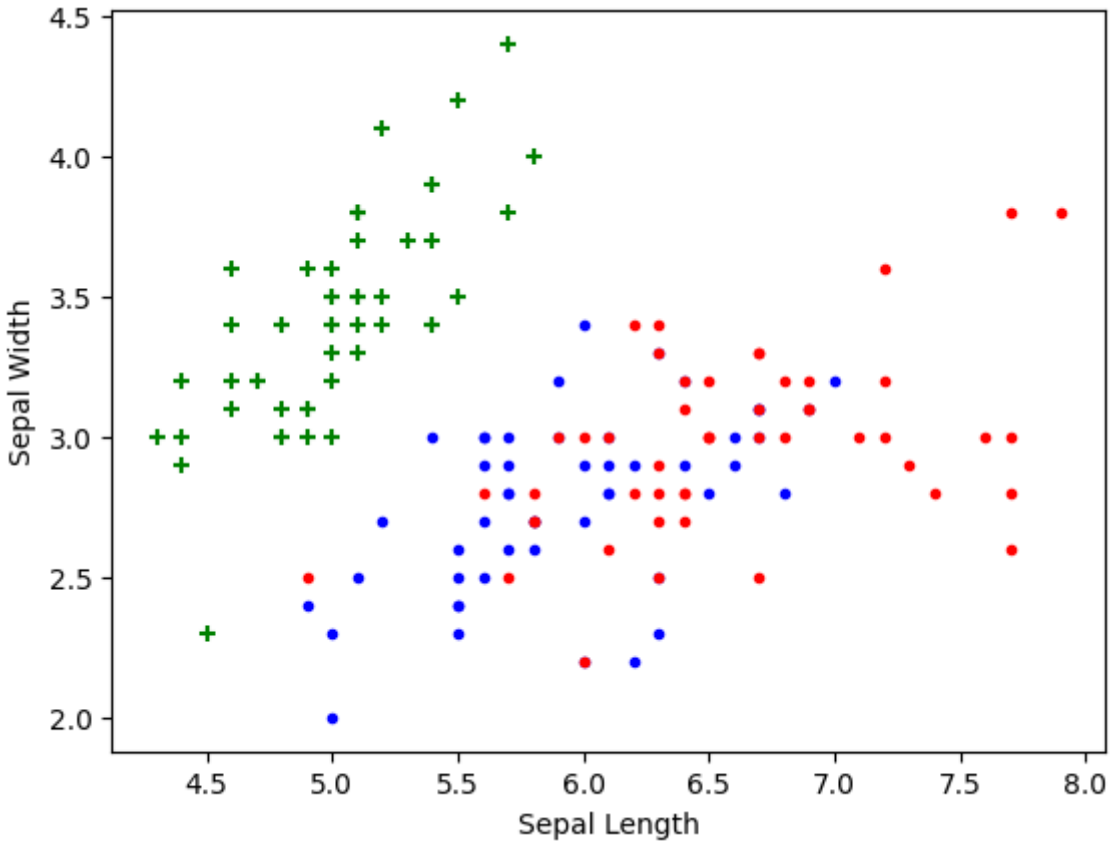
In [43]:

```
plt.xlabel('Sepal Length')
plt.ylabel('Sepal Width')

plt.scatter(df0['sepal length (cm)'], df0['sepal width (cm)'], color='green', marker='+')
plt.scatter(df1['sepal length (cm)'], df1['sepal width (cm)'], color='blue', marker='.')
plt.scatter(df2['sepal length (cm)'], df2['sepal width (cm)'], color='red', marker='.')
```

Out[43]:

```
<matplotlib.collections.PathCollection at 0x2570c65b250>
```



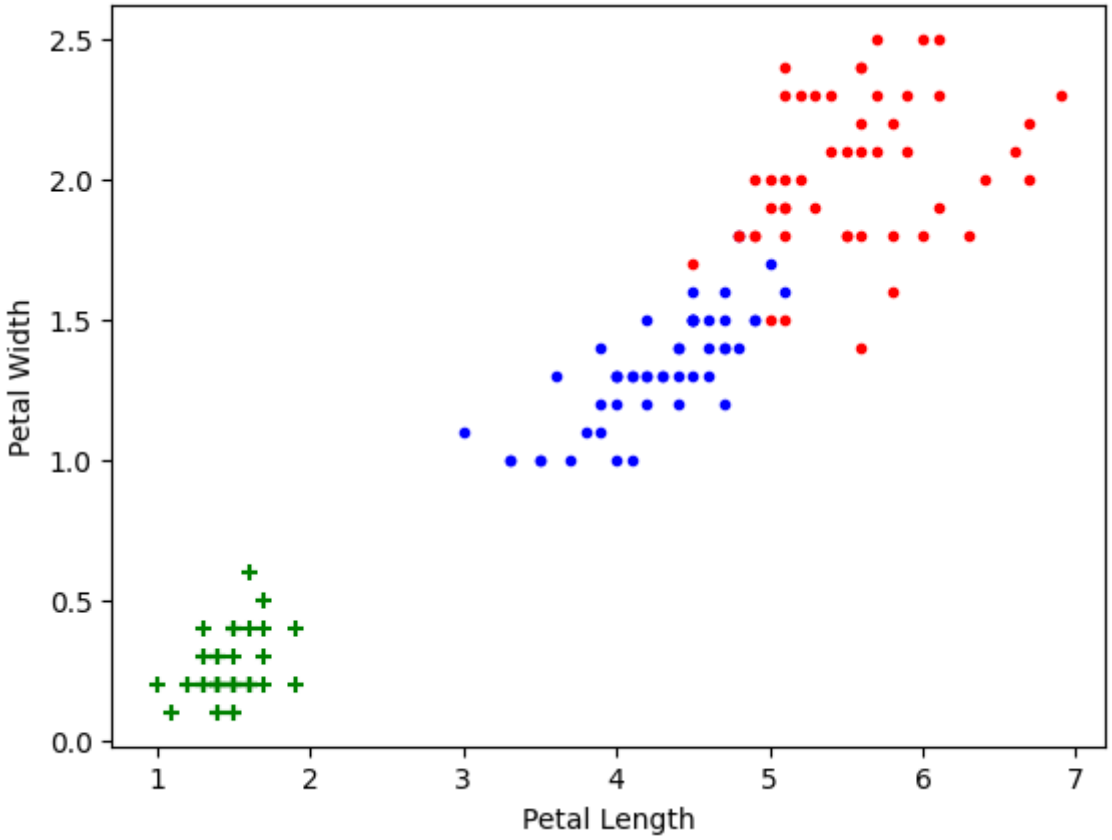
In [44]:

```
plt.xlabel('Petal Length')
plt.ylabel('Petal Width')

plt.scatter(df0['petal length (cm)'], df0['petal width (cm)'], color='green', marker='+')
plt.scatter(df1['petal length (cm)'], df1['petal width (cm)'], color='blue', marker='.')
plt.scatter(df2['petal length (cm)'], df2['petal width (cm)'], color='red', marker='.')
```

Out[44]:

```
<matplotlib.collections.PathCollection at 0x257091f1290>
```



In [46]:

```
from sklearn.model_selection import train_test_split
```

In [51]:

```
X=df.drop(['target','target names'],axis=1)
y=df['target']
```

In [52]:

```
X_train, X_test, y_train, y_test= train_test_split(X, y, test_size=0.2)
```

In [54]:

```
from sklearn.svm import SVC
model = SVC()
```

In [55]:

```
model.fit(X_train, y_train)
```

Out[55]:

SVC

SVC()

In [56]:

```
model.score(X_test, y_test)
```

Out[56]:

```
0.9666666666666667
```

Tune Parameters

1. Regularization(C)

In [59]:

```
model_C=SVC(C=1)
model_C.fit(X_train, y_train)
model_C.score(X_test, y_test)
```

Out[59]:

```
0.9666666666666667
```

2. Gamma

In [60]:

```
model_g = SVC(gamma=10)
model_g.fit(X_train, y_train)
model_g.score(X_test, y_test)
```

Out[60]:

```
0.9
```

3. Kernel

In [61]:

```
model_linear_kernal = SVC(kernel='linear')
model_linear_kernal.fit(X_train, y_train)
```

Out[61]:

```
SVC(kernel='linear')
```

In [62]:

```
model_linear_kernal.score(X_test, y_test)
```

Out[62]:

```
1.0
```

In [ ]:

```

```