In [1]:

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
```

In [2]:

```
iris=pd.read_csv("C:\\Users\\USER\\OneDrive\\Desktop\\iris.csv")
```

In [3]:

```
iris
```

Out[3]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 6 columns

In [4]:

```
iris.shape
```

Out[4]:

```
(150, 6)
```

In [5]:

```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Id             150 non-null    int64  
 1   SepalLengthCm  150 non-null    float64
 2   SepalWidthCm   150 non-null    float64
 3   PetalLengthCm  150 non-null    float64
 4   PetalWidthCm   150 non-null    float64
 5   Species        150 non-null    object 
dtypes: float64(4), int64(1), object(1)
memory usage: 7.2+ KB
```

In [6]:

```
print(iris.isna().sum())
print(iris.describe())
```

```
Id               0
SepalLengthCm    0
SepalWidthCm     0
PetalLengthCm    0
PetalWidthCm     0
Species          0
dtype: int64
               Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  PetalWidthCm
count  150.000000     150.000000    150.000000     150.000000    150.000000
mean    75.500000       5.843333      3.054000       3.758667      1.198667
std     43.445368       0.828066      0.433594       1.764420      0.763161
min      1.000000       4.300000      2.000000       1.000000      0.100000
25%     38.250000       5.100000      2.800000       1.600000      0.300000
50%     75.500000       5.800000      3.000000       4.350000      1.300000
75%    112.750000       6.400000      3.300000       5.100000      1.800000
max    150.000000       7.900000      4.400000       6.900000      2.500000
```

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

Out[7]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa

In [8]:
```
iris.head(150)
```

Out[8]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
0	1	5.1	3.5	1.4	0.2	Iris-setosa
1	2	4.9	3.0	1.4	0.2	Iris-setosa
2	3	4.7	3.2	1.3	0.2	Iris-setosa
3	4	4.6	3.1	1.5	0.2	Iris-setosa
4	5	5.0	3.6	1.4	0.2	Iris-setosa
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

150 rows × 6 columns

In [9]:
```
iris.tail(100)
```

Out[9]:

	Id	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm	Species
50	51	7.0	3.2	4.7	1.4	Iris-versicolor
51	52	6.4	3.2	4.5	1.5	Iris-versicolor
52	53	6.9	3.1	4.9	1.5	Iris-versicolor
53	54	5.5	2.3	4.0	1.3	Iris-versicolor
54	55	6.5	2.8	4.6	1.5	Iris-versicolor
...	...	...	...	...	...	...
145	146	6.7	3.0	5.2	2.3	Iris-virginica
146	147	6.3	2.5	5.0	1.9	Iris-virginica
147	148	6.5	3.0	5.2	2.0	Iris-virginica
148	149	6.2	3.4	5.4	2.3	Iris-virginica
149	150	5.9	3.0	5.1	1.8	Iris-virginica

100 rows × 6 columns

In [10]:

```
a= len(iris[iris['Species'] == 'Iris-versicolor'])
print("No of Versicolor in Dataset:",a)
```

```
No of Versicolor in Dataset: 50
```

In [11]:

```
b = len(iris[iris['Species'] == 'Iris-setosa'])
print("No of Setosa in Dataset:",b)
```

```
No of Setosa in Dataset: 50
```

In [12]:

```
c= len(iris[iris['Species'] == 'Iris-virginica'])
print("No of Virginica in Dataset:",c)
```

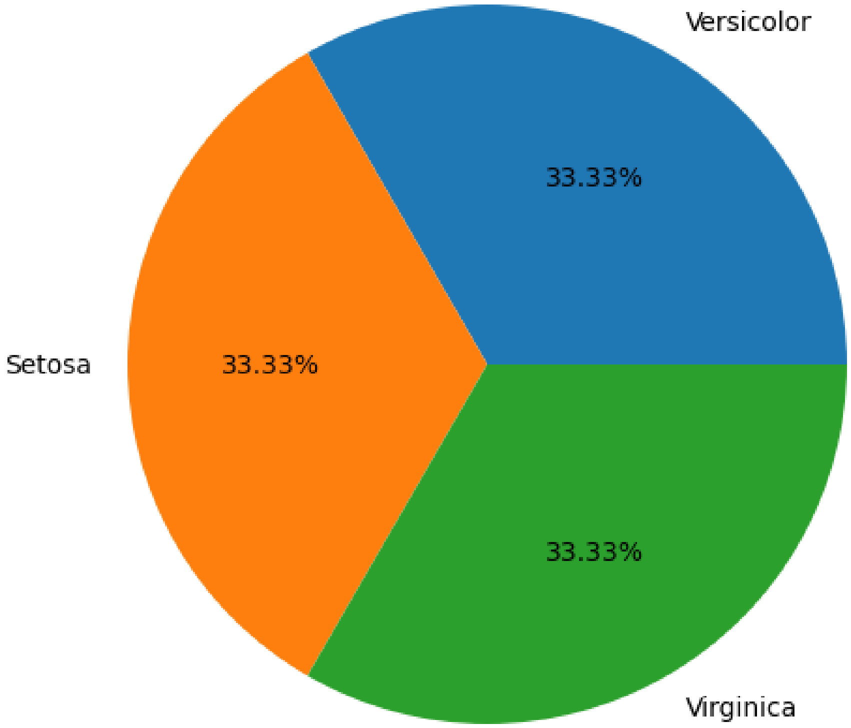
```
No of Virginica in Dataset: 50
```

In [13]:

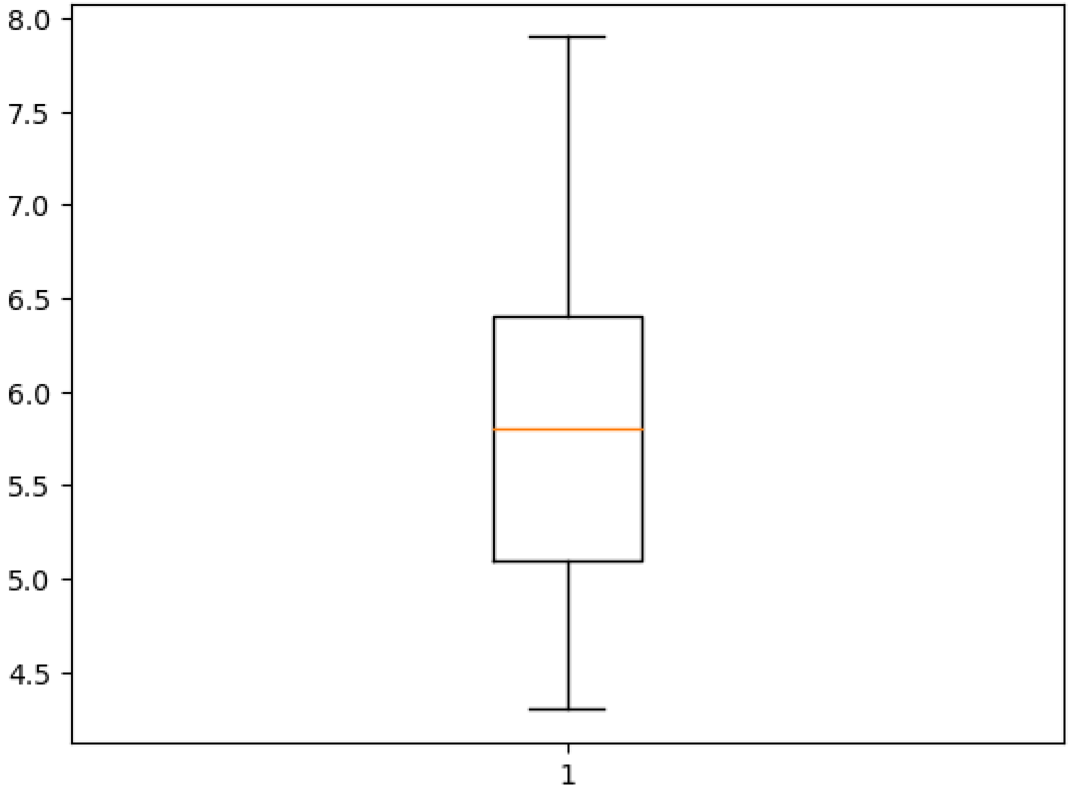
```
import seaborn as sns
import matplotlib.pyplot as plt


from warnings import filterwarnings
filterwarnings(action='ignore')
```

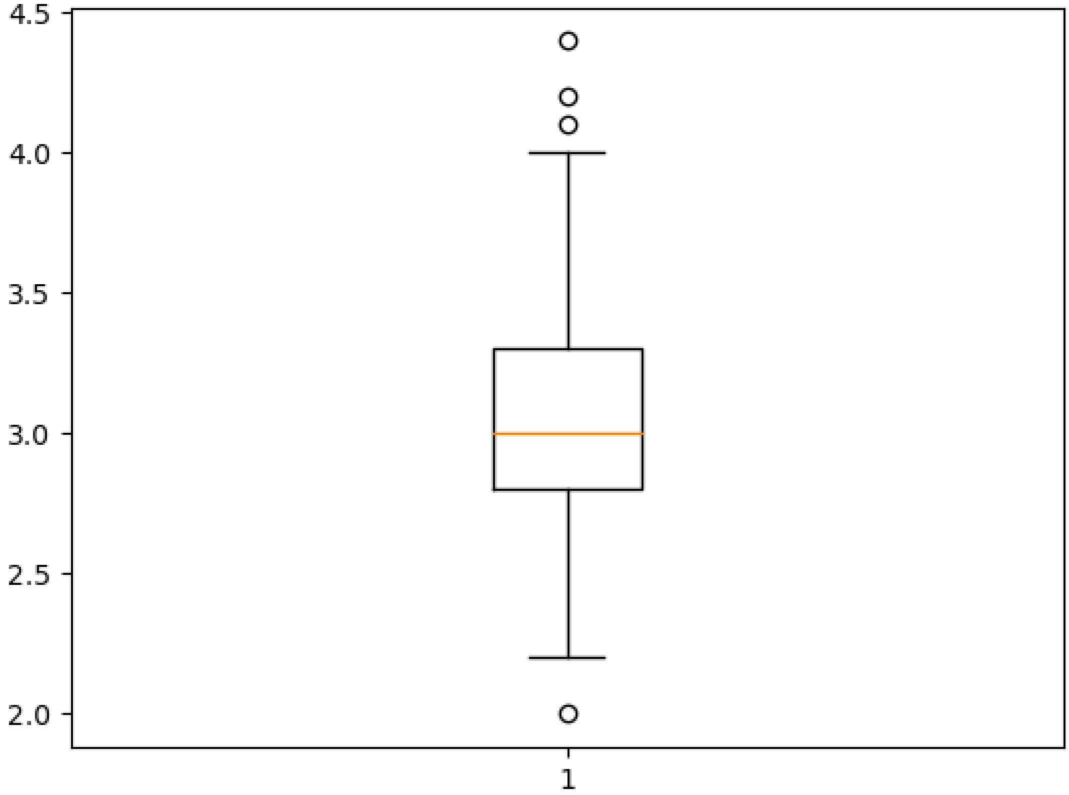
In [14]:

```
fig = plt.figure()
ax = fig.add_axes([0,0,1,1])
ax.axis('equal')
l = ['Versicolor', 'Setosa', 'Virginica']
s = [50,50,50]
ax.pie(s, labels = l,autopct='%1.2f%%')
plt.show()
```



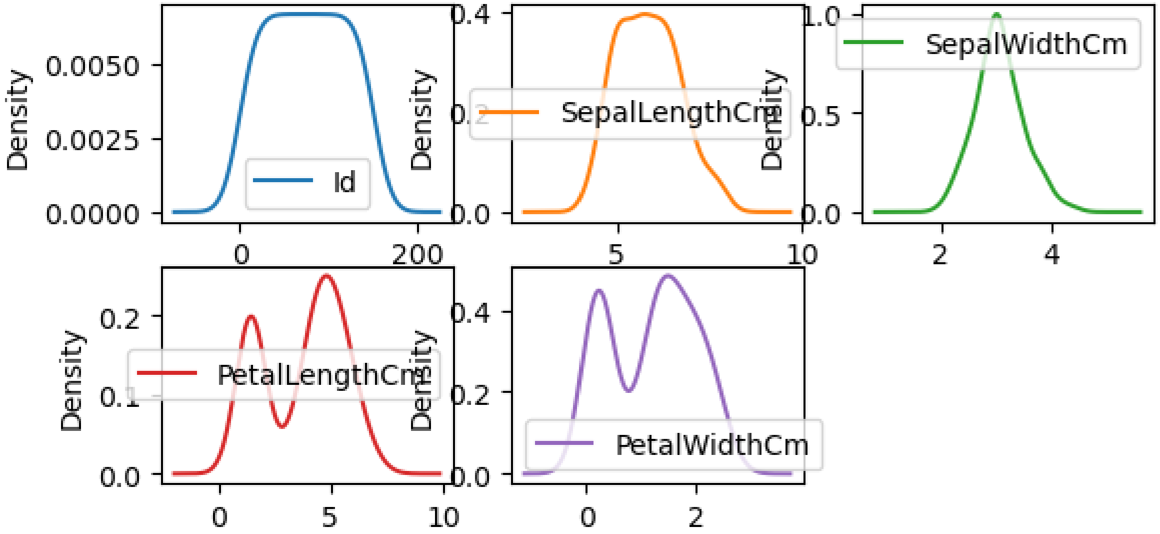
In [15]:
```
#Checking for outliars
import matplotlib.pyplot as plt
plt.figure(1)
plt.boxplot([iris['SepalLengthCm']])
plt.figure(2)
plt.boxplot([iris['SepalWidthCm']])
plt.show()
```





In [16]:
```
iris.plot(kind ='density',subplots = True, layout =(3,3),sharex = False)
```

Out[16]:
```
array([[<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>],
       [<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>],
       [<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>]], dtype=object)
```

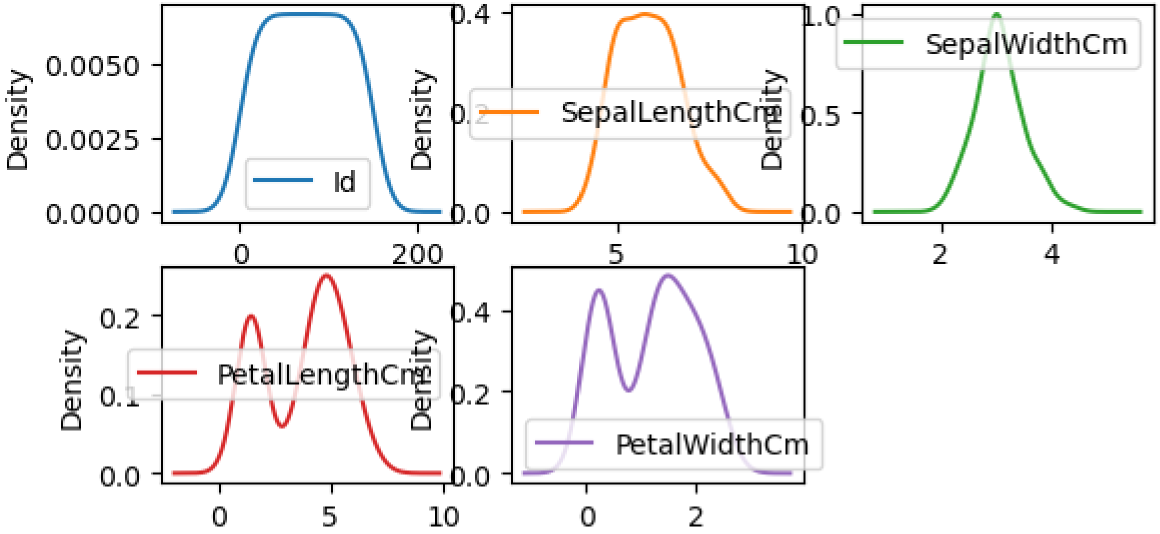


In [17]:

```
iris.plot(kind ='density',subplots = True, layout =(3,3),sharex = False)
```

Out[17]:

```
array([[<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>],
       [<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>],
       [<Axes: ylabel='Density'>, <Axes: ylabel='Density'>,
        <Axes: ylabel='Density'>]], dtype=object)
```

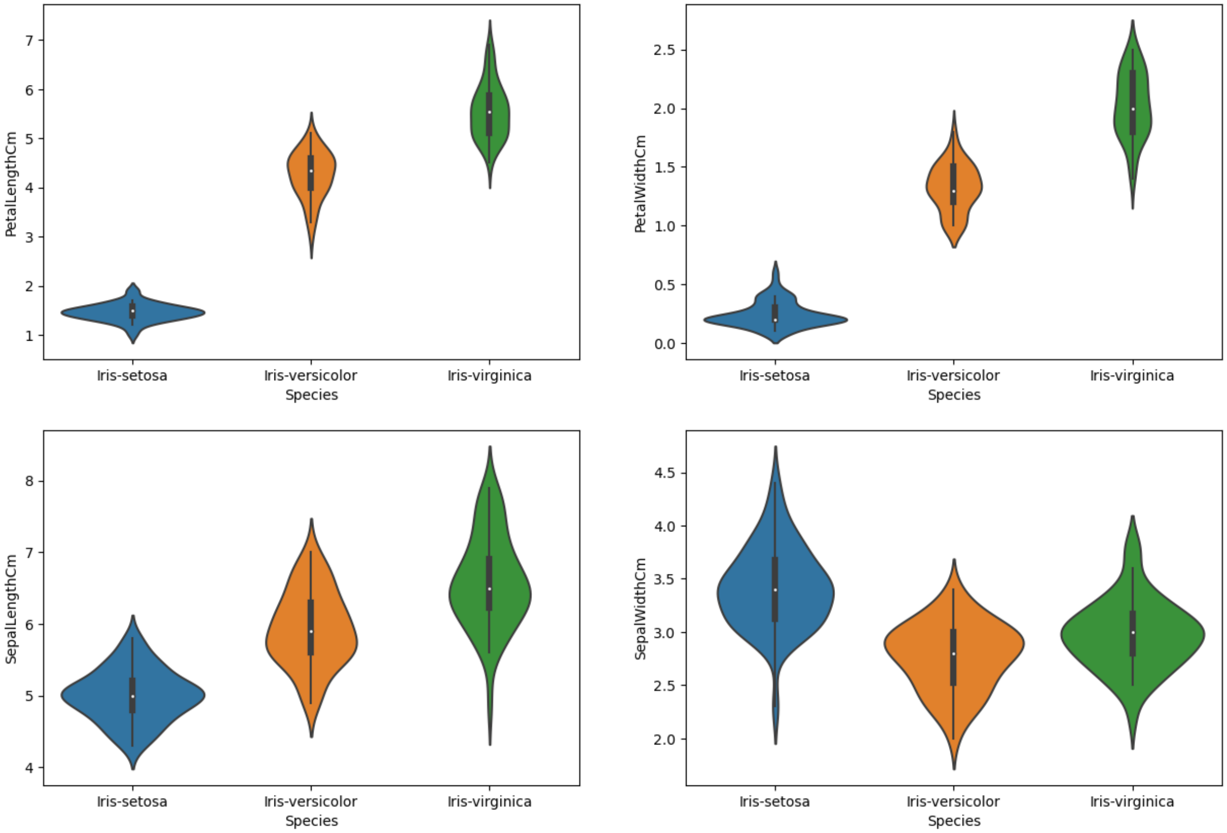


In [18]:

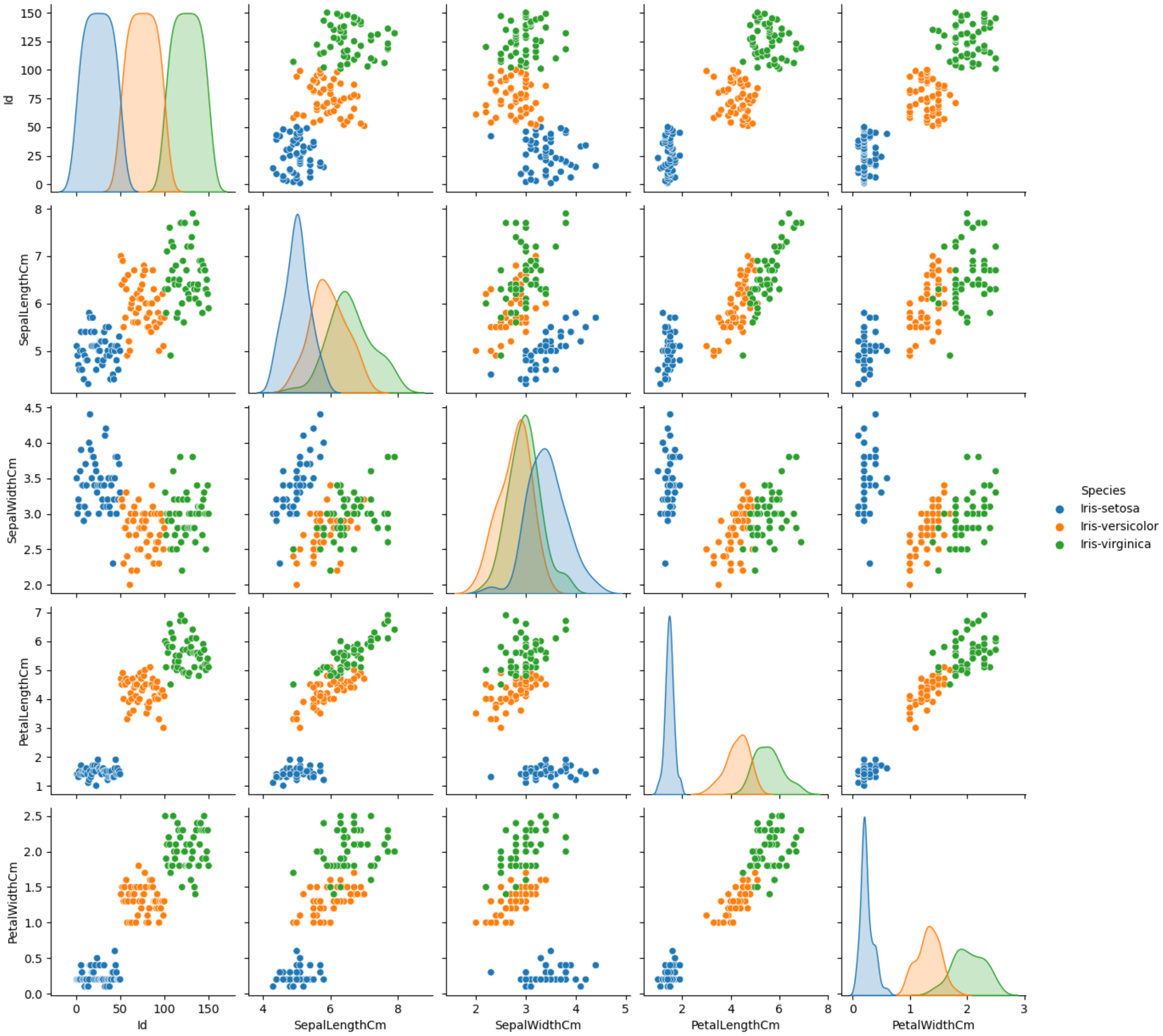
```
plt.figure(figsize=(15,10))
plt.subplot(2,2,1)
sns.violinplot(x='Species',y='PetalLengthCm',data=iris)
plt.subplot(2,2,2)
sns.violinplot(x='Species',y='PetalWidthCm',data=iris)
plt.subplot(2,2,3)
sns.violinplot(x='Species',y='SepalLengthCm',data=iris)
plt.subplot(2,2,4)
sns.violinplot(x='Species',y='SepalWidthCm',data=iris)
```

Out[18]:

```
<Axes: xlabel='Species', ylabel='SepalWidthCm'>
```



In [19]:
```
sns.pairplot(iris,hue='Species');
```



In [20]:

```
X = iris['SepalLengthCm'].values.reshape(-1,1)
print(X)
```

```
[[5.1]
 [4.9]
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```

```
       [5. ]
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       [6.7]
       [5.6]
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       [6.2]
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       [5.7]
       [5.8]
       [6.4]
       [6.5]
       [7.7]
       [7.7]
       [6. ]
```

```
 [6.9]
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 [5.9]]
```

In [21]:

```
Y = iris['SepalWidthCm'].values.reshape(-1,1)
print(Y)
```

```
[[3.5]
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 [3.1]
 [3. ]
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 [3.1]
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 [3.2]
 [3.3]
 [3. ]
 [2.5]
 [3. ]
 [3.4]
 [3. ]]
```
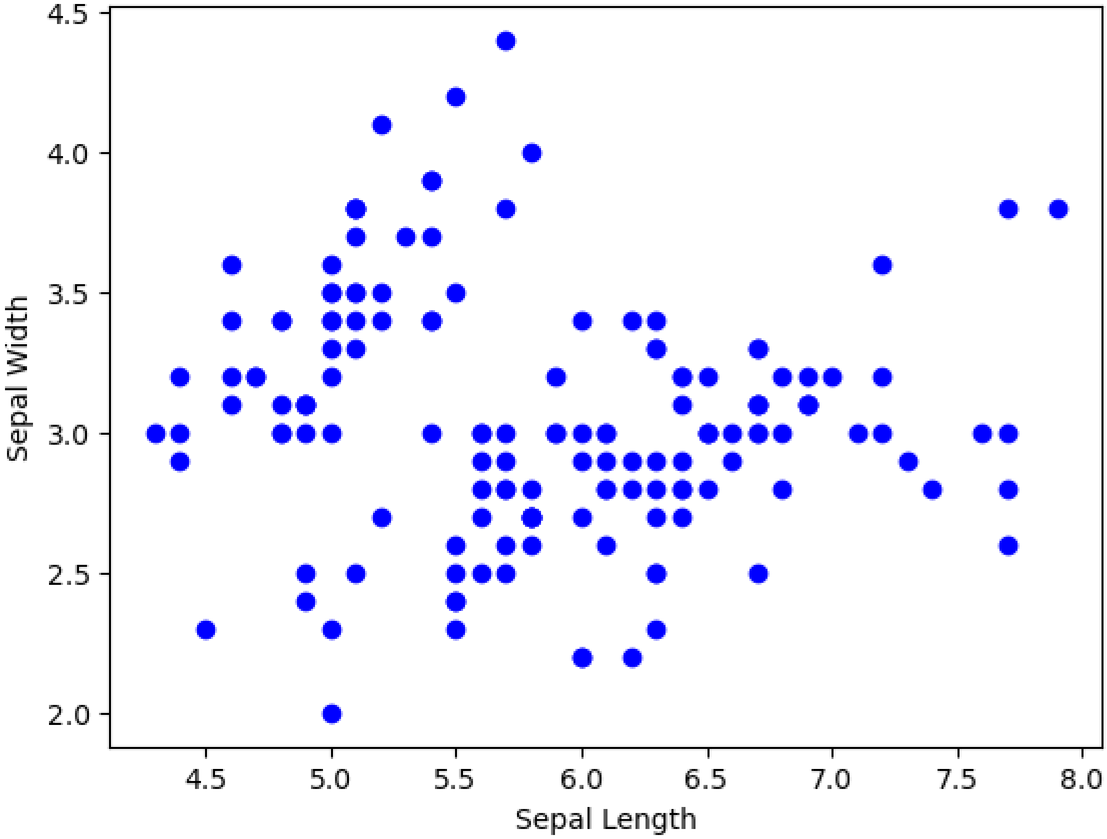

In [22]:

```
plt.xlabel("Sepal Length")
plt.ylabel("Sepal Width")
plt.scatter(X,Y,color='b')
plt.show()
```



In [23]:

```
#Correlation
corr_mat = iris.corr()
print(corr_mat)
```

```
                     Id  SepalLengthCm  SepalWidthCm  PetalLengthCm  \
Id             1.000000       0.716676     -0.397729       0.882747   
SepalLengthCm  0.716676       1.000000     -0.109369       0.871754   
SepalWidthCm  -0.397729      -0.109369      1.000000      -0.420516   
PetalLengthCm  0.882747       0.871754     -0.420516       1.000000   
PetalWidthCm   0.899759       0.817954     -0.356544       0.962757   

               PetalWidthCm  
Id                 0.899759  
SepalLengthCm      0.817954  
SepalWidthCm      -0.356544  
PetalLengthCm      0.962757  
PetalWidthCm       1.000000  
```

In [24]:

```
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn import svm
from sklearn import metrics
from sklearn.tree import DecisionTreeClassifier
```

In [25]:

```
train, test = train_test_split(iris, test_size = 0.25)
print(train.shape)
print(test.shape)
```

```
(112, 6)
(38, 6)
```

In [26]:

```
train_X = train[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm',
                 'PetalWidthCm']]
train_y = train.Species

test_X = test[['SepalLengthCm', 'SepalWidthCm', 'PetalLengthCm',
                 'PetalWidthCm']]
test_y = test.Species
```

In [27]:

```
train_X.head()
```

Out[27]:

	SepalLengthCm	SepalWidthCm	PetalLengthCm	PetalWidthCm
27	5.2	3.5	1.5	0.2
122	7.7	2.8	6.7	2.0
98	5.1	2.5	3.0	1.1
46	5.1	3.8	1.6	0.2
83	6.0	2.7	5.1	1.6

In [28]:

```
test_y.head()
```

Out[28]:

```
36         Iris-setosa
126     Iris-virginica
89     Iris-versicolor
101     Iris-virginica
132     Iris-virginica
Name: Species, dtype: object
```

In [30]:

```
#Using LogisticRegression
model = LogisticRegression()
model.fit(train_X, train_y)
prediction = model.predict(test_X)
print('Accuracy:',metrics.accuracy_score(prediction,test_y))
```

```
Accuracy: 0.9210526315789473
```

In [31]:

```
#Confusion matrix
from sklearn.metrics import confusion_matrix,classification_report
confusion_mat = confusion_matrix(test_y,prediction)
print("Confusion matrix: \n",confusion_mat)
print(classification_report(test_y,prediction))
```

```
Confusion matrix: 
 [[ 8  0  0]
 [ 0 10  0]
 [ 0  3 17]]
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00         8
Iris-versicolor       0.77      1.00      0.87        10
 Iris-virginica       1.00      0.85      0.92        20

       accuracy                           0.92        38
      macro avg       0.92      0.95      0.93        38
   weighted avg       0.94      0.92      0.92        38
```

In [32]:

```
#Using Support Vector
from sklearn.svm import SVC
model1 = SVC()
model1.fit(train_X,train_y)

pred_y = model1.predict(test_X)

from sklearn.metrics import accuracy_score
print("Acc=",accuracy_score(test_y,pred_y))
```

```
Acc= 0.9210526315789473
```

In [33]:

```
#Using KNN Neighbors
from sklearn.neighbors import KNeighborsClassifier
model2 = KNeighborsClassifier(n_neighbors=5)
model2.fit(train_X,train_y)
y_pred2 = model2.predict(test_X)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(test_y,y_pred2))
```

```
Accuracy Score: 0.9736842105263158
```

In [34]:

```
#Using GaussianNB
from sklearn.naive_bayes import GaussianNB
model3 = GaussianNB()
model3.fit(train_X,train_y)
y_pred3 = model3.predict(test_X)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(test_y,y_pred3))
```

```
Accuracy Score: 0.9736842105263158
```

In [35]:

```
#Using Decision Tree
from sklearn.tree import DecisionTreeClassifier
model4 = DecisionTreeClassifier(criterion='entropy',random_state=7)
model4.fit(train_X,train_y)
y_pred4 = model4.predict(test_X)

from sklearn.metrics import accuracy_score
print("Accuracy Score:",accuracy_score(test_y,y_pred4))
```

```
Accuracy Score: 0.8947368421052632
```

In [36]:

```
results = pd.DataFrame({
    'Model': ['Logistic Regression','Support Vector Machines', 'Naive Bayes','KNN' ,'D
    'Score': [0.947,0.947,0.947,0.947,0.921]})

result_df = results.sort_values(by='Score', ascending=False)
result_df = result_df.set_index('Score')
result_df.head(9)
```

Out[36]:

	Model
Score	
0.947	Logistic Regression
0.947	Support Vector Machines
0.947	Naive Bayes
0.947	KNN
0.921	Decision Tree

In [ ]: