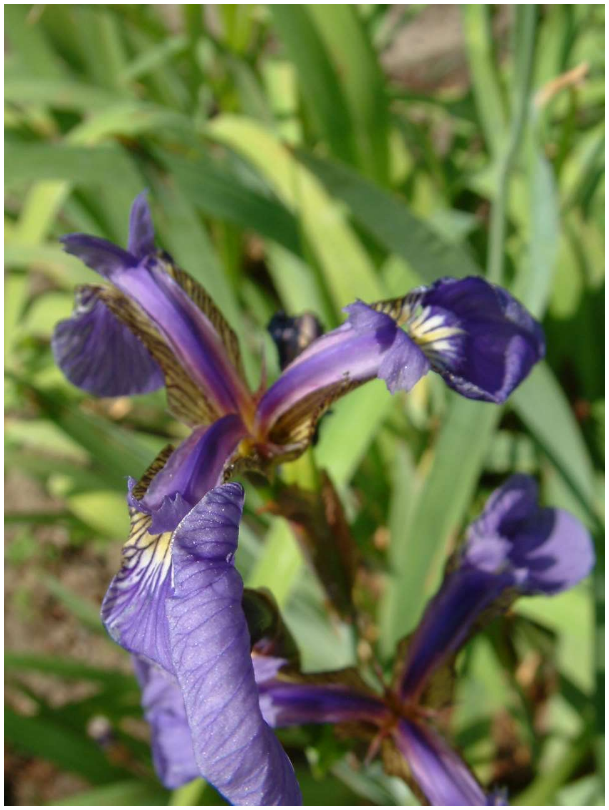
In [1]:

```python
# The Iris Setosa
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/5/56/Kosaciec_szczecinkowaty_Iris
Image(url,width=300, height=300)
```

Out[1]:



In [2]:

```python
# The Iris Versicolor
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/4/41/Iris_versicolor_3.jpg'
Image(url,width=300, height=300)
```

Out[2]:

In [3]:

```python
# The Iris Virginica
from IPython.display import Image
url = 'http://upload.wikimedia.org/wikipedia/commons/9/9f/Iris_virginica.jpg'
Image(url,width=300, height=300)
```

Out[3]:

The iris dataset contains measurements for 150 iris flowers from three different species.

The three classes in the Iris dataset:

```
Iris-setosa (n=50)
Iris-versicolor (n=50)
Iris-virginica (n=50)
```

The four features of the Iris dataset:

```
sepal length in cm
sepal width in cm
petal length in cm
petal width in cm
```

In [5]:

```
import seaborn as sns
```

In [11]:

```
iris = sns.load_dataset('iris')
iris.head()
```

Out[11]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

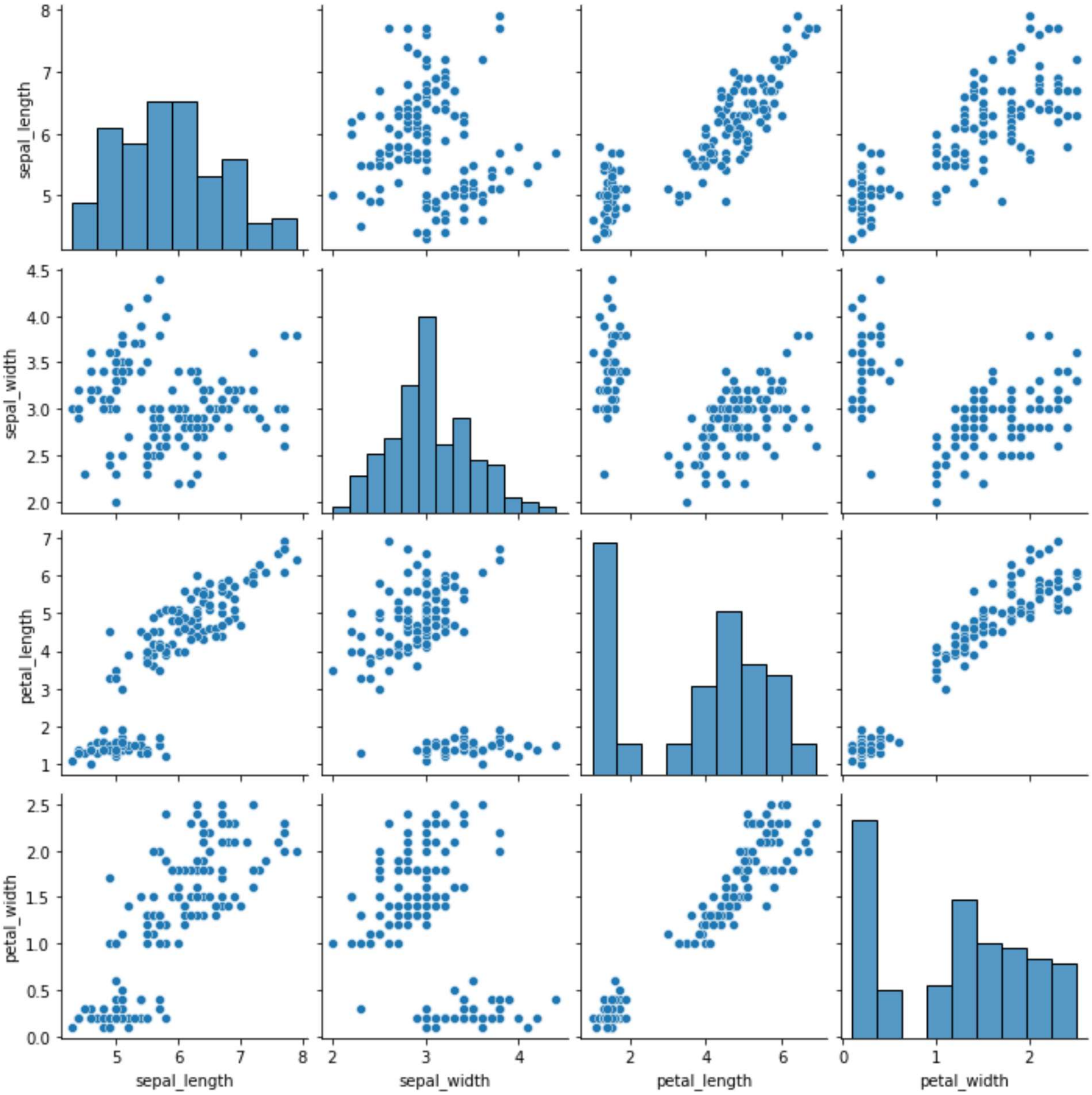
Exploratory Data Analysis and Libraries

In [7]:

```
import matplotlib.pyplot as plt
import numpy as np
```

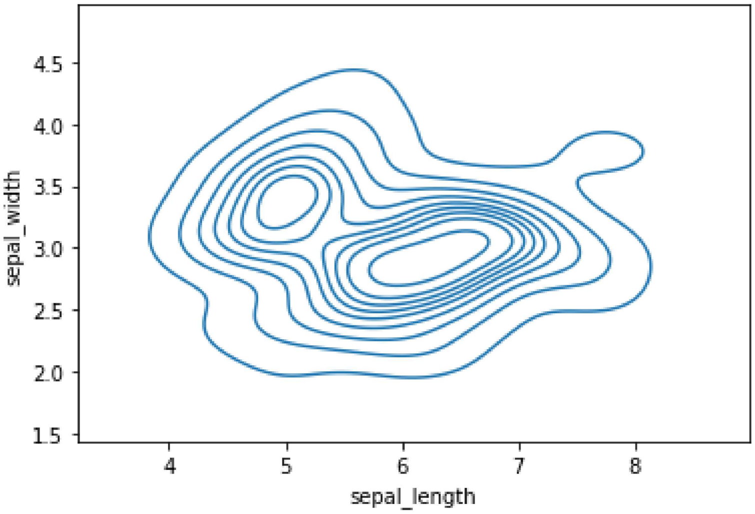
In [8]:
```
sns.pairplot(iris)
```

Out[8]:
```
<seaborn.axisgrid.PairGrid at 0x2811427b430>
```



In [9]:
```
sns.kdeplot(x = iris['sepal_length'], y = iris['sepal_width'])
```

Out[9]:
```
<AxesSubplot:xlabel='sepal_length', ylabel='sepal_width'>
```



Training Test Split

In [10]:
```
from sklearn.model_selection import train_test_split
```

In [12]:
```
X = iris.drop("species", axis =1)
y = iris['species']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state
```

Building a Model

In [13]:
```
from sklearn.svm import SVC
```

In [15]:
```
SVC_model = SVC()
```

In [16]:
```
SVC_model.fit(X_train, y_train)
```

Out[16]:
```
SVC()
```

Model Evaluation

In [20]:
```
pred = SVC_model.predict(X_test)
```

In [21]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [23]:
```
print(confusion_matrix(y_test,pred))
```

```
[[19  0  0]
 [ 0 15  0]
 [ 0  0 16]]
```

In [24]:
```
print(classification_report(y_test,pred))
```

```
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        15
   virginica       1.00      1.00      1.00        16

    accuracy                           1.00        50
   macro avg       1.00      1.00      1.00        50
weighted avg       1.00      1.00      1.00        50
```

Our model does quite good job, but for the sake of practice lets do the grid search as well

Gridsearch Practice

In [25]:

```
from sklearn.model_selection import GridSearchCV
```

In [26]:

```
param_grid = {'C': [0.1,1, 10, 100], 'gamma': [1,0.1,0.01,0.001]}
```

In [27]:

```
grid = GridSearchCV(SVC(),param_grid,refit=True,verbose=2)
grid.fit(X_train,y_train)
```

```
Fitting 5 folds for each of 16 candidates, totalling 80 fits
[CV] END .....................................C=0.1, gamma=1; total time=   0.0s
[CV] END .....................................C=0.1, gamma=1; total time=   0.0s
[CV] END .....................................C=0.1, gamma=1; total time=   0.0s
[CV] END .....................................C=0.1, gamma=1; total time=   0.0s
[CV] END .....................................C=0.1, gamma=1; total time=   0.0s
[CV] END ...................................C=0.1, gamma=0.1; total time=   0.0s
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[CV] END ...................................C=0.1, gamma=0.1; total time=   0.0s
[CV] END ...................................C=0.1, gamma=0.1; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.01; total time=   0.0s
[CV] END ..................................C=0.1, gamma=0.01; total time=   0.0s
[CV] END .................................C=0.1, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.1, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.1, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.1, gamma=0.001; total time=   0.0s
[CV] END .................................C=0.1, gamma=0.001; total time=   0.0s
[CV] END .......................................C=1, gamma=1; total time=   0.0s
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[CV] END .....................................C=1, gamma=0.1; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ....................................C=1, gamma=0.01; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ...................................C=1, gamma=0.001; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ......................................C=10, gamma=1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ....................................C=10, gamma=0.1; total time=   0.0s
[CV] END ...................................C=10, gamma=0.01; total time=   0.0s
[CV] END ...................................C=10, gamma=0.01; total time=   0.0s
[CV] END ...................................C=10, gamma=0.01; total time=   0.0s
[CV] END ...................................C=10, gamma=0.01; total time=   0.0s
[CV] END ...................................C=10, gamma=0.01; total time=   0.0s
[CV] END ..................................C=10, gamma=0.001; total time=   0.0s
[CV] END ..................................C=10, gamma=0.001; total time=   0.0s
[CV] END ..................................C=10, gamma=0.001; total time=   0.0s
[CV] END ..................................C=10, gamma=0.001; total time=   0.0s
```

```
[CV] END ..................................C=10, gamma=0.001; total time=   0.0s
[CV] END .....................................C=100, gamma=1; total time=   0.0s
[CV] END .....................................C=100, gamma=1; total time=   0.0s
[CV] END .....................................C=100, gamma=1; total time=   0.0s
[CV] END .....................................C=100, gamma=1; total time=   0.0s
[CV] END .....................................C=100, gamma=1; total time=   0.0s
[CV] END ...................................C=100, gamma=0.1; total time=   0.0s
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[CV] END ...................................C=100, gamma=0.1; total time=   0.0s
[CV] END ...................................C=100, gamma=0.1; total time=   0.0s
[CV] END ...................................C=100, gamma=0.1; total time=   0.0s
[CV] END ..................................C=100, gamma=0.01; total time=   0.0s
[CV] END ..................................C=100, gamma=0.01; total time=   0.0s
[CV] END ..................................C=100, gamma=0.01; total time=   0.0s
[CV] END ..................................C=100, gamma=0.01; total time=   0.0s
[CV] END ..................................C=100, gamma=0.01; total time=   0.0s
[CV] END .................................C=100, gamma=0.001; total time=   0.0s
[CV] END .................................C=100, gamma=0.001; total time=   0.0s
[CV] END .................................C=100, gamma=0.001; total time=   0.0s
[CV] END .................................C=100, gamma=0.001; total time=   0.0s
[CV] END .................................C=100, gamma=0.001; total time=   0.0s
```

Out[27]:
```
GridSearchCV(estimator=SVC(),
             param_grid={'C': [0.1, 1, 10, 100],
                         'gamma': [1, 0.1, 0.01, 0.001]},
             verbose=2)
```

In [28]:
```
grid_predictions = grid.predict(X_test)
```

In [29]:
```
print(confusion_matrix(y_test, grid_predictions))
```

```
[[19  0  0]
 [ 0 15  0]
 [ 0  0 16]]
```

In [30]:
```
print(classification_report(y_test, grid_predictions))
```

```
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        15
   virginica       1.00      1.00      1.00        16

    accuracy                           1.00        50
   macro avg       1.00      1.00      1.00        50
weighted avg       1.00      1.00      1.00        50
```