```python
from sklearn.datasets import load_iris
import pandas as pd

# Load the Iris dataset
iris = load_iris()
X = iris.data  # Features (sepal length, sepal width, petal length, petal width)
y = iris.target  # Target labels (species)

# Convert to DataFrame for easier manipulation
df = pd.DataFrame(data=X, columns=iris.feature_names)
df['species'] = iris.target
```

```python
print(df.head())
print(df.describe())
print(df['species'].value_counts())
```

```
   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

   species
0        0
1        0
2        0
3        0
4        0
       sepal length (cm)  sepal width (cm)  petal length (cm)  \
count         150.000000        150.000000         150.000000
mean            5.843333          3.057333           3.758000
std             0.828066          0.435866           1.765298
min             4.300000          2.000000           1.000000
25%             5.100000          2.800000           1.600000
50%             5.800000          3.000000           4.350000
75%             6.400000          3.300000           5.100000
max             7.900000          4.400000           6.900000

       petal width (cm)     species
count        150.000000  150.000000
mean           1.199333    1.000000
std            0.762238    0.819232
min            0.100000    0.000000
25%            0.300000    0.000000
50%            1.300000    1.000000
75%            1.800000    2.000000
max            2.500000    2.000000
species
0    50
1    50
2    50
Name: count, dtype: int64
```

```python
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler

# Split the data
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)

# Standardize features
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

```python
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, classification_report

# Initialize and train the model
model = LogisticRegression()
model.fit(X_train, y_train)

# Predict and evaluate
y_pred = model.predict(X_test)
print("Accuracy:", accuracy_score(y_test, y_pred))
print(classification_report(y_test, y_pred, target_names=iris.target_names))
```

```
Accuracy: 1.0
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        13
   virginica       1.00      1.00      1.00        13
```

```
        accuracy                           1.00        45
       macro avg       1.00      1.00      1.00        45
    weighted avg       1.00      1.00      1.00        45
```

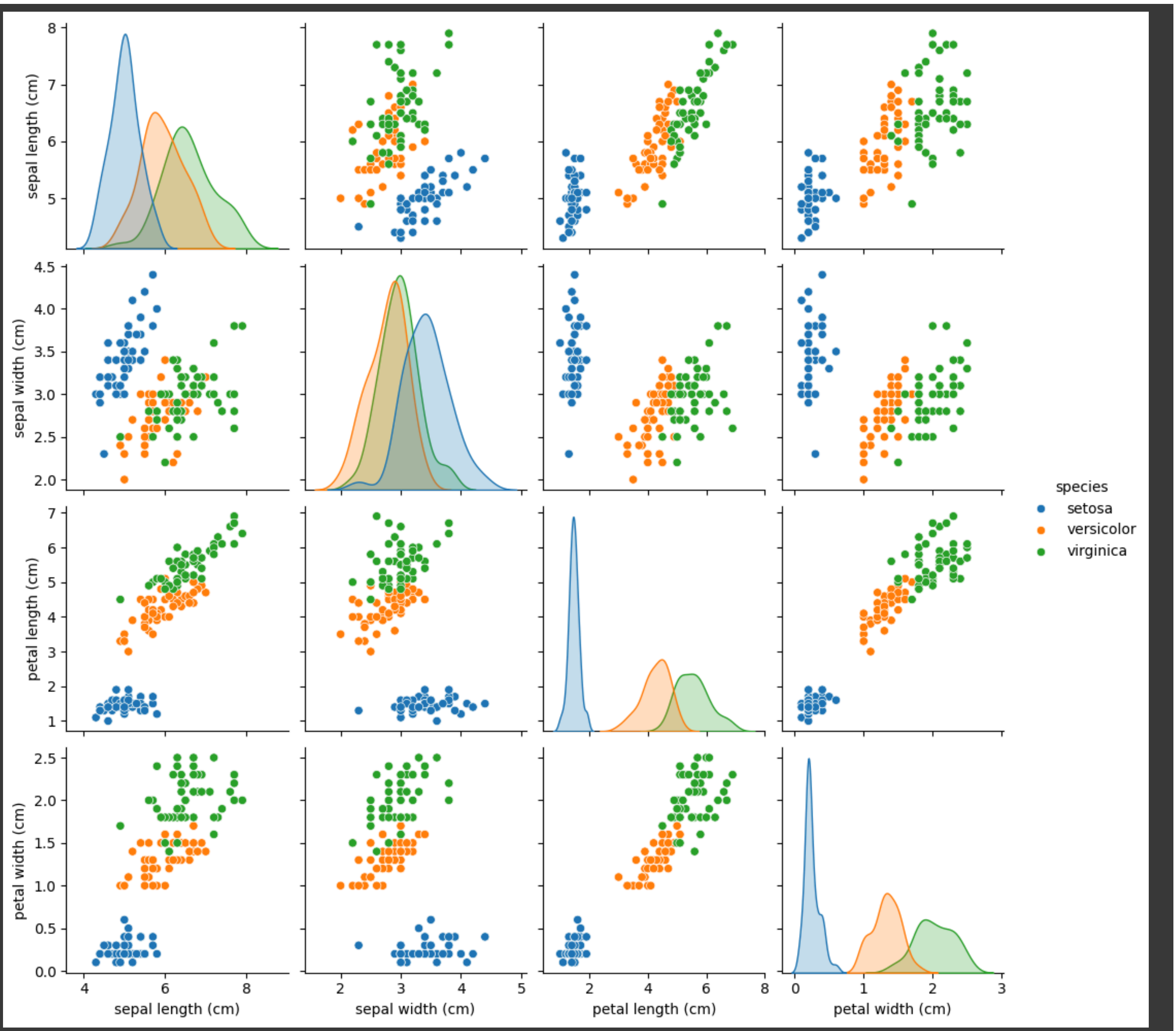
```
from sklearn.tree import DecisionTreeClassifier

# Initialize and train the model
model = DecisionTreeClassifier()
model.fit(X_train, y_train)

# Predict and evaluate
y_pred = model.predict(X_test)
print("Accuracy:", accuracy_score(y_test, y_pred))
print(classification_report(y_test, y_pred, target_names=iris.target_names))
```

```
Accuracy: 1.0
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        13
   virginica       1.00      1.00      1.00        13

    accuracy                           1.00        45
   macro avg       1.00      1.00      1.00        45
weighted avg       1.00      1.00      1.00        45
```

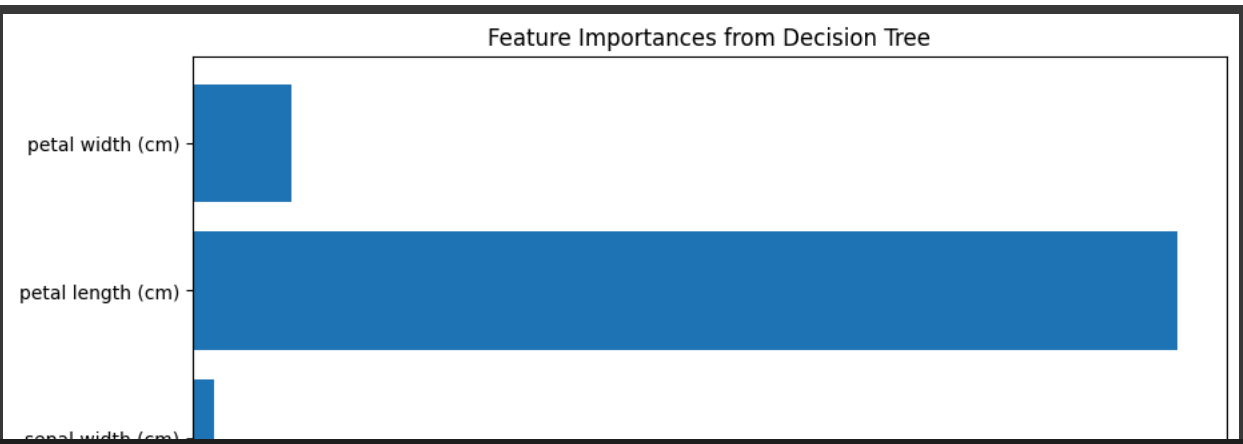
```
from sklearn.neighbors import KNeighborsClassifier

# Initialize and train the model
model = KNeighborsClassifier()
model.fit(X_train, y_train)

# Predict and evaluate
y_pred = model.predict(X_test)
print("Accuracy:", accuracy_score(y_test, y_pred))
print(classification_report(y_test, y_pred, target_names=iris.target_names))
```

```
Accuracy: 1.0
              precision    recall  f1-score   support

      setosa       1.00      1.00      1.00        19
  versicolor       1.00      1.00      1.00        13
   virginica       1.00      1.00      1.00        13

    accuracy                           1.00        45
   macro avg       1.00      1.00      1.00        45
weighted avg       1.00      1.00      1.00        45
```

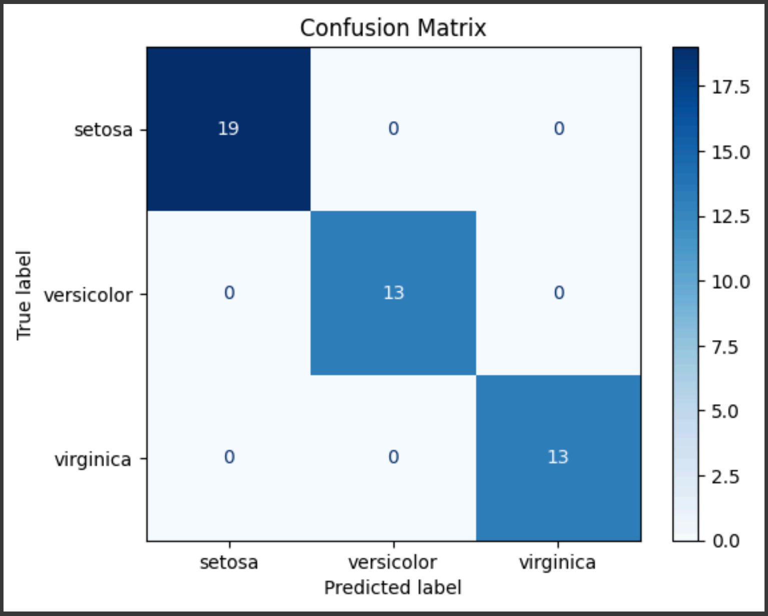
```
import seaborn as sns
import matplotlib.pyplot as plt

# Convert to DataFrame for easier plotting
df = pd.DataFrame(data=X, columns=iris.feature_names)
df['species'] = iris.target

# Map target labels to species names
df['species'] = df['species'].map({i: species for i, species in enumerate(iris.target_names)})

# Plot pairplot
sns.pairplot(df, hue='species')
plt.show()
```



```
from sklearn.tree import DecisionTreeClassifier

# Train a Decision Tree model
model = DecisionTreeClassifier()
model.fit(X_train, y_train)

# Plot feature importances
importances = model.feature_importances_
features = iris.feature_names

plt.figure(figsize=(10, 6))
plt.barh(features, importances)
plt.xlabel('Feature Importance')
plt.title('Feature Importances from Decision Tree')
plt.show()
```



```
from sklearn.metrics import confusion_matrix, ConfusionMatrixDisplay

# Predict with the chosen model (e.g., Decision Tree)
y_pred = model.predict(X_test)

# Compute confusion matrix
cm = confusion_matrix(y_test, y_pred)

# Display confusion matrix
disp = ConfusionMatrixDisplay(confusion_matrix=cm, display_labels=iris.target_names)
disp.plot(cmap=plt.cm.Blues)
plt.title('Confusion Matrix')
plt.show()
```


Confusion Matrix
True label
setosa
versicolor
virginica
setosa
versicolor
virginica
Predicted label