Code & OUTPUT

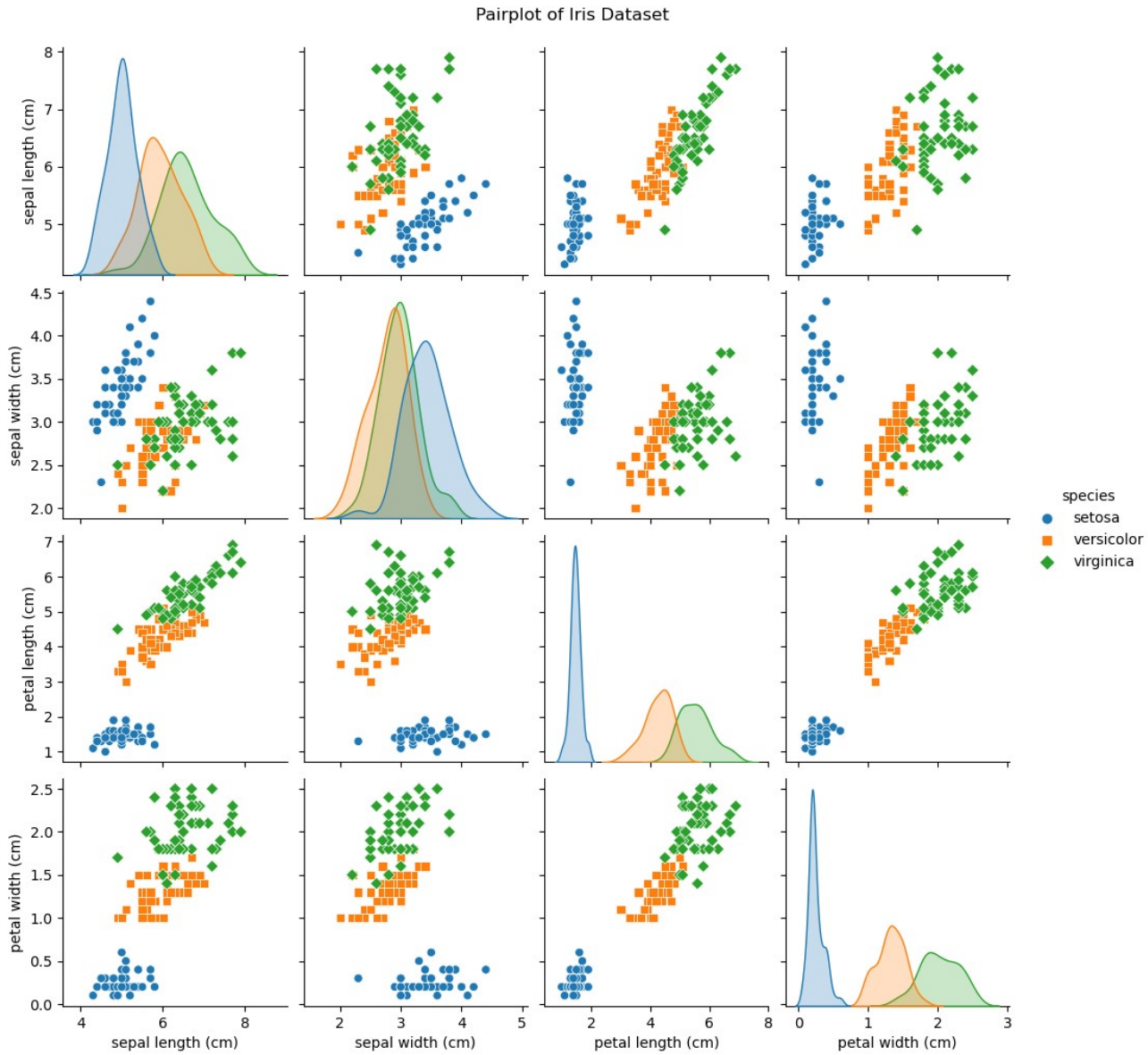
In [1]:
```
print("Experiment No 03 : To perform data preprocessing and data visualization on iris dataset.")
```

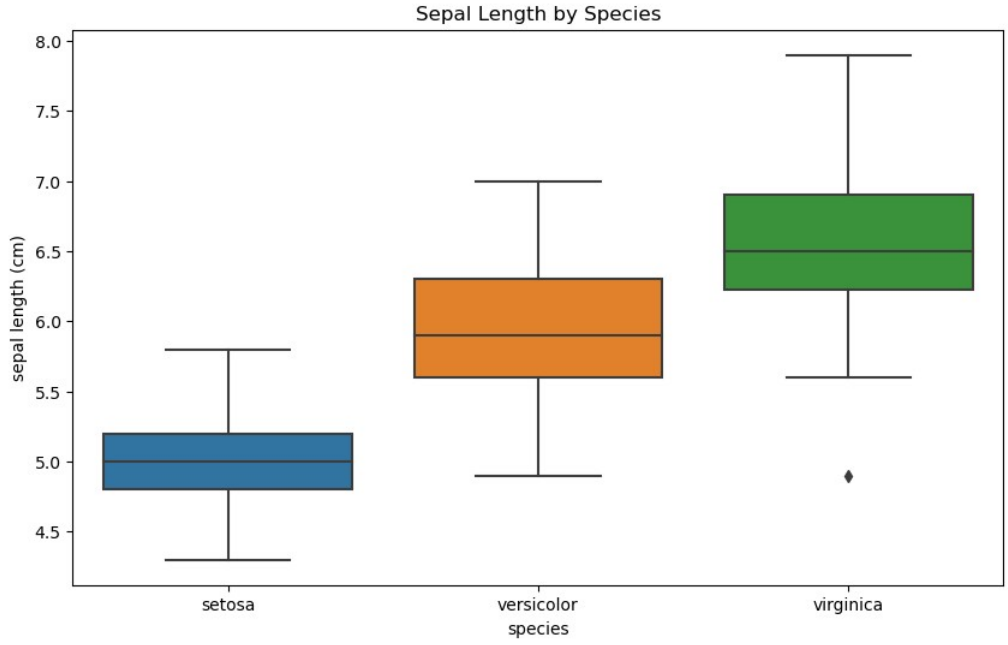
```
Experiment No 03 : To perform data preprocessing and data visualization on iris dataset.
```

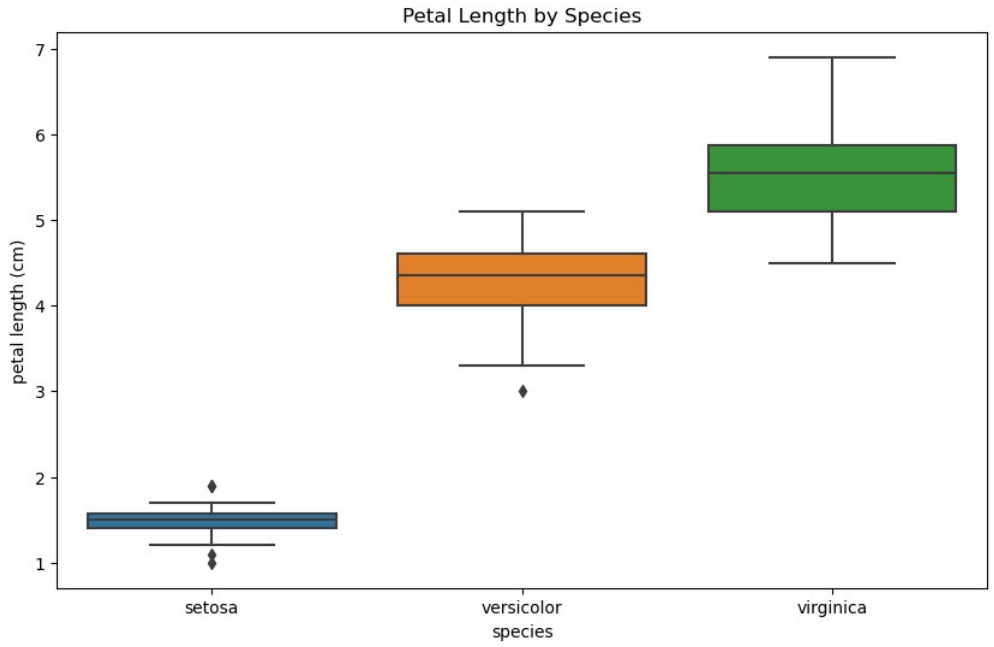
In [4]:
```
# Import necessary libraries
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.datasets import load_iris
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
print("OUTPUT:\n\n")

# Load the iris dataset
iris = load_iris()
df = pd.DataFrame(iris.data, columns=iris.feature_names)
df['species'] = iris.target
df['species'] = df['species'].apply(lambda x: iris.target_names[x])

# Display basic information about the dataset
print("Dataset preview:")
print(df.head())
print("\nDataset summary:")
print(df.describe())
print("\nClass distribution:")
print(df['species'].value_counts())

# Data Preprocessing
# Separate features and target
X = df.iloc[:, :-1]  # Features (sepal and petal measurements)
y = df['species']    # Target (species)

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

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

print("\nData preprocessing complete.")

# Data Visualization

# Pair Plot
sns.pairplot(df, hue='species', markers=["o", "s", "D"])
plt.suptitle("Pairplot of Iris Dataset", y=1.02)
plt.show()

# Box Plot for Sepal Length and Petal Length by Species
plt.figure(figsize=(10, 6))
sns.boxplot(x='species', y='sepal length (cm)', data=df)
plt.title("Sepal Length by Species")
plt.show()

plt.figure(figsize=(10, 6))
sns.boxplot(x='species', y='petal length (cm)', data=df)
plt.title("Petal Length by Species")
plt.show()

# Violin Plot for Sepal Width and Petal Width by Species
plt.figure(figsize=(10, 6))
sns.violinplot(x='species', y='sepal width (cm)', data=df)
plt.title("Sepal Width by Species")
plt.show()

plt.figure(figsize=(10, 6))
sns.violinplot(x='species', y='petal width (cm)', data=df)
plt.title("Petal Width by Species")
plt.show()

# Heatmap of Correlation Matrix (excluding species column)
plt.figure(figsize=(8, 6))
sns.heatmap(df.iloc[:, :-1].corr(), annot=True, cmap='coolwarm', square=True)
plt.title("Correlation Heatmap of Iris Dataset")
plt.show()

# Histograms of Each Feature
df.iloc[:, :-1].hist(edgecolor='black', linewidth=1.2, figsize=(10, 8))
plt.suptitle("Feature Distributions")
plt.show()
```

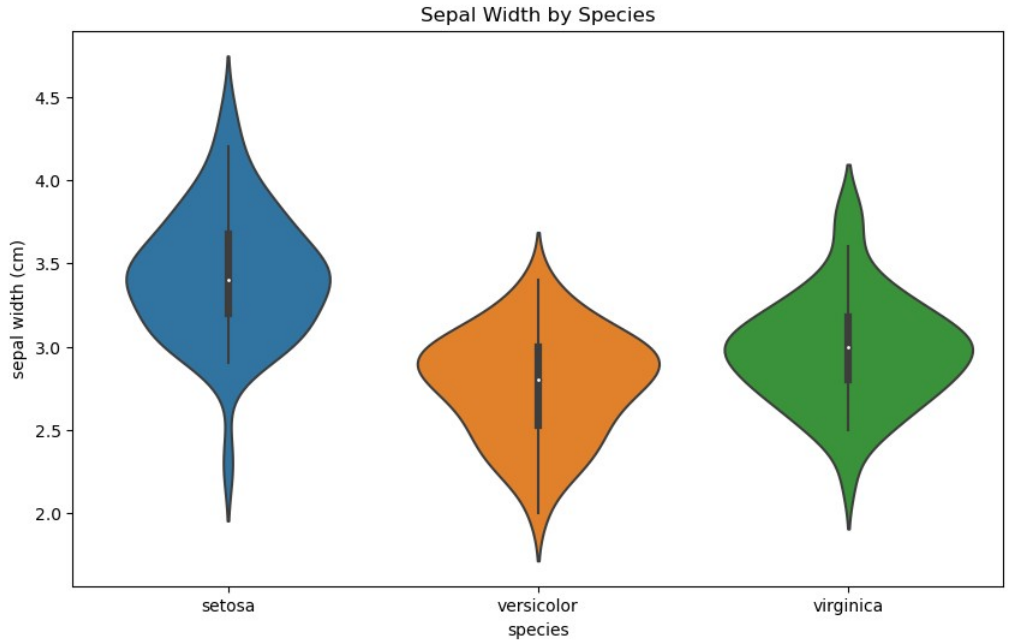
OUTPUT:

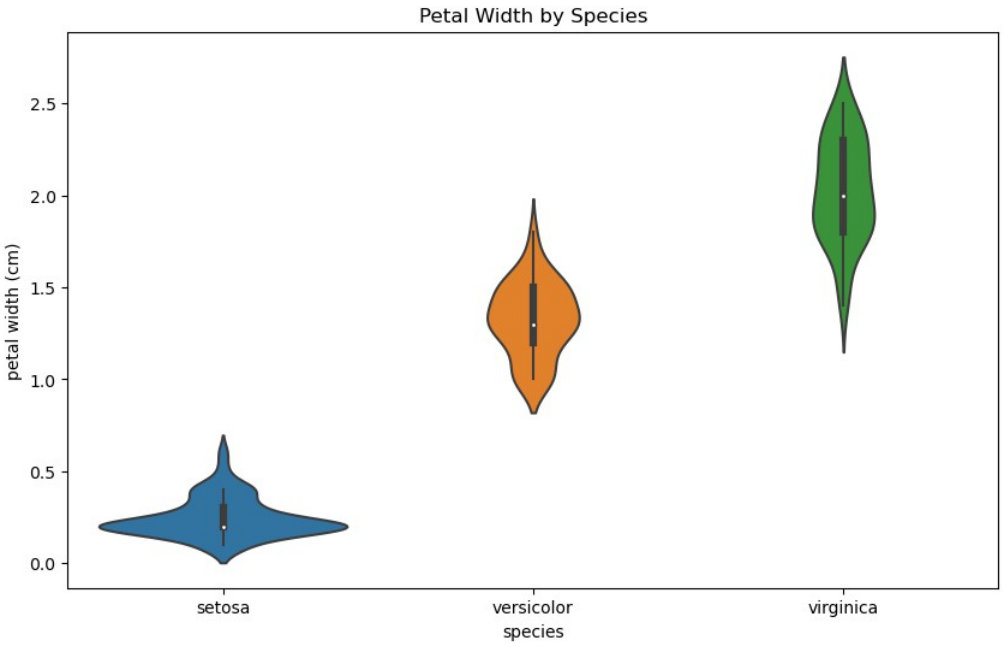
```
Dataset preview:
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)  \
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2          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

  species
0  setosa
1  setosa
2  setosa
3  setosa
4  setosa

Dataset summary:
       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)
count        150.000000
mean           1.199333
std            0.762238
min            0.100000
25%            0.300000
50%            1.300000
75%            1.800000
max            2.500000

Class distribution:
species
setosa        50
versicolor    50
virginica     50
Name: count, dtype: int64

Data preprocessing complete.
c:\Users\hp\anaconda3\Lib\site-packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

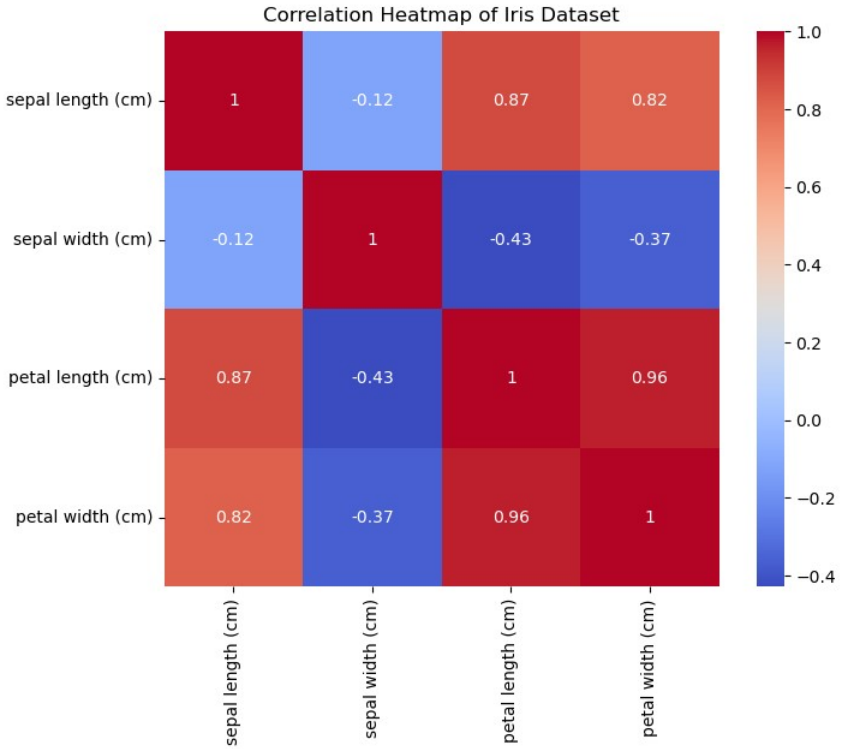

Pairplot of Iris Dataset
sepal length (cm)
sepal width (cm)
petal length (cm)
petal width (cm)
species
setosa
versicolor
virginica


Sepal Length by Species
sepal length (cm)
setosa
versicolor
virginica
species


Petal Length by Species
petal length (cm)
7
6
5
4
3
2
1
setosa
versicolor
virginica
species


Sepal Width by Species
sepal width (cm)
4.5
4.0
3.5
3.0
2.5
2.0
setosa
versicolor
virginica
species


Petal Width by Species
petal width (cm)
2.5
2.0
1.5
1.0
0.5
0.0
setosa
versicolor
virginica
species


Correlation Heatmap of Iris Dataset
sepal length (cm)
sepal width (cm)
petal length (cm)
petal width (cm)
1
-0.12
0.87
0.82
-0.12
1
-0.43
-0.37
0.87
-0.43
1
0.96
0.82
-0.37
0.96
1
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

Feature Distributions