```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

iris_df=sns.load_dataset("iris")

iris_df.head()
```

	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

```
iris_df.isnull().sum()
```

```
sepal_length    0
sepal_width     0
petal_length    0
petal_width     0
species         0
dtype: int64
```

```
iris_df.duplicated().sum()
```

```
1
```

```
iris_df.drop_duplicates(inplace=True)

iris_df.duplicated().sum()
```

```
0
```

```
from sklearn.preprocessing import LabelEncoder

enc=LabelEncoder()

iris_df["species"]=enc.fit_transform(iris_df['species'])

iris_df.head()
```

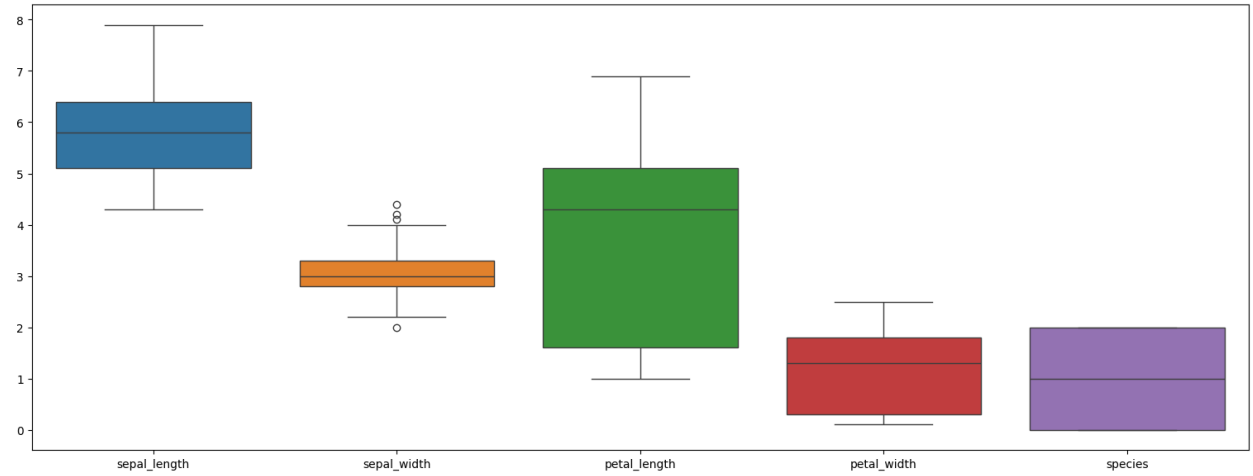
	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	0
1	4.9	3.0	1.4	0.2	0
2	4.7	3.2	1.3	0.2	0
3	4.6	3.1	1.5	0.2	0
4	5.0	3.6	1.4	0.2	0

```
iris_df.tail()
```

```
     sepal_length  sepal_width  petal_length  petal_width  species
145           6.7          3.0           5.2          2.3        2
146           6.3          2.5           5.0          1.9        2
147           6.5          3.0           5.2          2.0        2
148           6.2          3.4           5.4          2.3        2
149           5.9          3.0           5.1          1.8        2
```

```
plt.figure(figsize=(19,7))
sns.boxplot(iris_df)
```

```
<Axes: >
```




```
q1=iris_df.quantile(0.25)
q3=iris_df.quantile(0.75)
iqr=q3-q1
iqr
```

```
sepal_length    1.3
sepal_width     0.5
petal_length    3.5
petal_width     1.5
species         2.0
dtype: float64
```

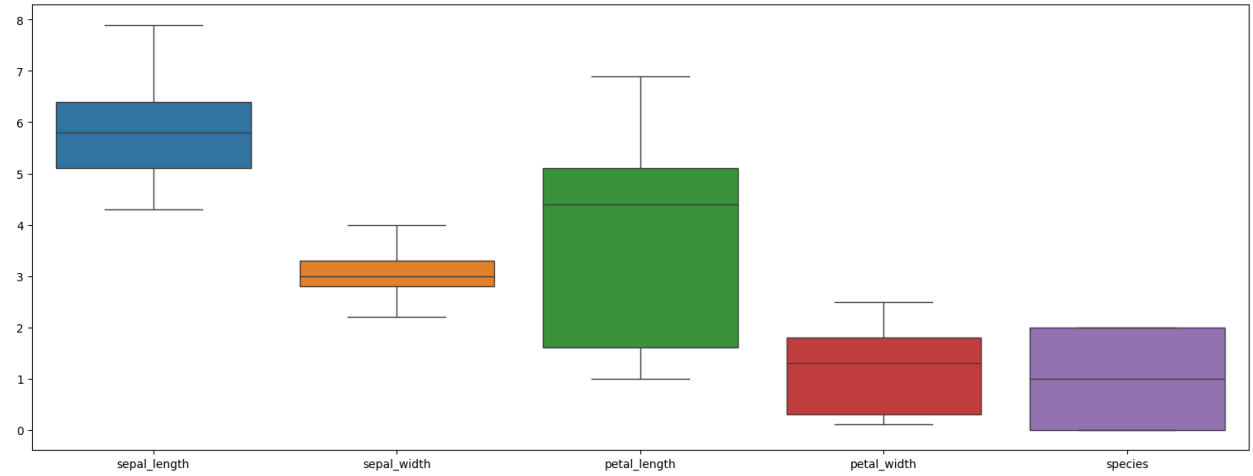
```
ul=q3+1.5*iqr
ll=q1-1.5*iqr
ul,ll
```

```
(sepal_length     8.35
 sepal_width      4.05
 petal_length    10.35
 petal_width      4.05
 species          5.00
 dtype: float64,
 sepal_length    3.15
```

```
 sepal_width     2.05
 petal_length   -3.65
 petal_width    -1.95
 species        -3.00
 dtype: float64)

iris_df=iris_df[-((iris_df>ul)|(iris_df<ll)).any(axis=1)]

plt.figure(figsize=(19,7))
sns.boxplot(iris_df)
plt.show()
```




```
iris_df.info()

<class 'pandas.core.frame.DataFrame'>
Index: 145 entries, 0 to 149
Data columns (total 5 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   sepal_length  145 non-null    float64
 1   sepal_width   145 non-null    float64
 2   petal_length  145 non-null    float64
 3   petal_width   145 non-null    float64
 4   species       145 non-null    int32
dtypes: float64(4), int32(1)
memory usage: 6.2 KB

iris_df.describe()

       sepal_length  sepal_width  petal_length  petal_width
species
count    145.000000   145.000000    145.000000   145.000000
145.000000
mean       5.857241     3.042759      3.797931     1.215862
1.013793
```

```
std         0.836971     0.398216      1.760819     0.759905
0.816379
min         4.300000     2.200000      1.000000     0.100000
0.000000
25%         5.100000     2.800000      1.600000     0.300000
0.000000
50%         5.800000     3.000000      4.400000     1.300000
1.000000
75%         6.400000     3.300000      5.100000     1.800000
2.000000
max         7.900000     4.000000      6.900000     2.500000
2.000000
```

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

```
x=iris_df.drop(columns=['species'])
y=iris_df['species']
```

```
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.2,random_st
ate=17)
```

```
from sklearn.tree import DecisionTreeClassifier
```

```
clf=DecisionTreeClassifier(random_state=17)
```

```
clf.fit(xtrain,ytrain)
```

```
DecisionTreeClassifier(random_state=17)
```

```
ypred=clf.predict(xtest)
```

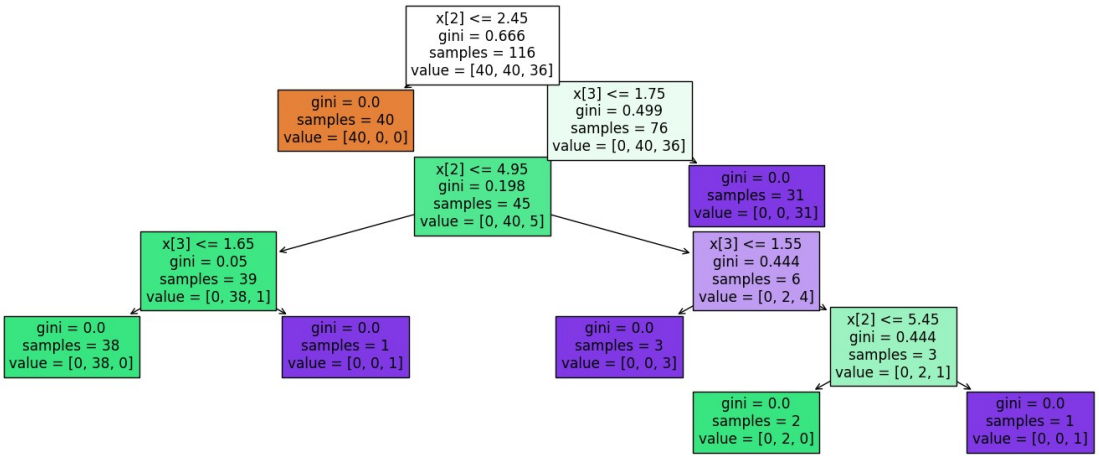
```
acc=sklearn.metrics.accuracy_score(ytest,ypred)
```

```
acc
```

```
0.9655172413793104
```

```
from sklearn.tree import plot_tree
```

```
plt.figure(figsize=(19,7))
plot_tree(clf,filled=True)
plt.show()
```


x[2] <= 2.45
gini = 0.666
samples = 116
value = [40, 40, 36]
gini = 0.0
samples = 40
value = [40, 0, 0]
x[3] <= 1.75
gini = 0.499
samples = 76
value = [0, 40, 36]
x[2] <= 4.95
gini = 0.198
samples = 45
value = [0, 40, 5]
gini = 0.0
samples = 31
value = [0, 0, 31]
x[3] <= 1.65
gini = 0.05
samples = 39
value = [0, 38, 1]
x[3] <= 1.55
gini = 0.444
samples = 6
value = [0, 2, 4]
gini = 0.0
samples = 38
value = [0, 38, 0]
gini = 0.0
samples = 1
value = [0, 0, 1]
gini = 0.0
samples = 3
value = [0, 0, 3]
x[2] <= 5.45
gini = 0.444
samples = 3
value = [0, 2, 1]
gini = 0.0
samples = 2
value = [0, 2, 0]
gini = 0.0
samples = 1
value = [0, 0, 1]