```
Out[41]:  mpg              0
          cylinders        0
          displacement     0
          horsepower       0
          weight           0
          acceleration     0
          dtype: int64
```

In [42]: `Y.isnull().sum()`

```
Out[42]:  origin    0
          dtype: int64
```

In [43]: `X.shape`

Out[43]: `(398, 6)`

In [44]:
```python
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.25, random
```

In [45]: `X_train.shape`

Out[45]: `(298, 6)`

In [46]:
```python
from sklearn.tree import DecisionTreeClassifier
dt=DecisionTreeClassifier()
```

In [47]: `dt.fit(X_train,Y_train)`

Out[47]:
```
    ▼   DecisionTreeClassifier  ⓘ ⓞ

DecisionTreeClassifier()
```

In [48]: `Y_pred = dt.predict(X_test)`

In [49]: `dt.score(X_test,Y_test)`

Out[49]: `0.89`

In [50]:
```python
import numpy as np
from sklearn.metrics import accuracy_score,f1_score,recall_score,precision_score
```

In [51]:
```python
print('Accuracy: %.3f' % accuracy_score(Y_test, Y_pred))
print('f1 score: %.3f' % f1_score(Y_test, Y_pred,average='micro'))
print('recall: %.3f' % recall_score(Y_test, Y_pred, average='macro'))
print('Precision: %.3f' % precision_score(Y_test, Y_pred,average='micro'))
```

```
Accuracy: 0.890
f1 score: 0.890
recall: 0.836
Precision: 0.890
```

In [61]:
```python
from sklearn import tree
clf=tree.DecisionTreeClassifier(max_depth=3)
clf=clf.fit(X_train,Y_train)
```

```
tree.plot_tree(clf)
```

Out[61]: [Text(0.5555555555555556, 0.875, 'x[2] <= 134.5\ngini = 0.542\nsamples = 298\nv
alue = [53.0, 60.0, 185.0]'),
 Text(0.3333333333333333, 0.625, 'x[4] <= 2757.5\ngini = 0.647\nsamples = 128\n
value = [45, 54, 29]'),
 Text(0.2222222222222222, 0.375, 'x[2] <= 97.25\ngini = 0.643\nsamples = 119\nv
alue = [36, 54, 29]'),
 Text(0.1111111111111111, 0.125, 'gini = 0.526\nsamples = 57\nvalue = [21, 33,
3]'),
 Text(0.3333333333333333, 0.125, 'gini = 0.651\nsamples = 62\nvalue = [15, 21,
26]'),
 Text(0.4444444444444444, 0.375, 'gini = 0.0\nsamples = 9\nvalue = [9, 0, 0]'),
 Text(0.7777777777777778, 0.625, 'x[2] <= 195.197\ngini = 0.154\nsamples = 170
\nvalue = [8, 6, 156]'),
 Text(0.6666666666666666, 0.375, 'x[4] <= 3087.5\ngini = 0.462\nsamples = 47\nv
alue = [8.0, 6.0, 33.0]'),
 Text(0.5555555555555556, 0.125, 'gini = 0.309\nsamples = 38\nvalue = [1, 6, 3
1]'),
 Text(0.7777777777777778, 0.125, 'gini = 0.346\nsamples = 9\nvalue = [7, 0,
2]'),
 Text(0.8888888888888888, 0.375, 'gini = 0.0\nsamples = 123\nvalue = [0, 0, 12
3]')]
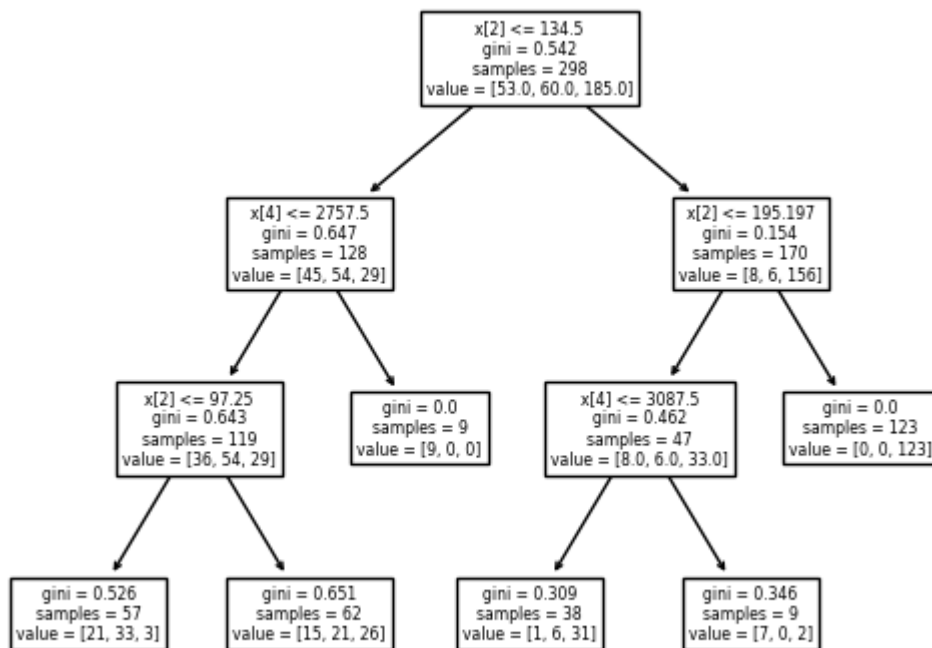
In [54]:
```python
import numpy as np
user_input = []
mpg = 25
cylinders = 5
displacement = 82
horsepower = 50
weight = 200
acceleration = 100
user_input.append([mpg, cylinders, displacement, horsepower, weight, acceleratio

user_input = np.array(user_input)
```