In [ ]:
```
import numpy as np
import pandas as pd
from sklearn.preprocessing import LabelEncoder
from sklearn.tree import DecisionTreeClassifier
from sklearn.tree import export_graphviz
from IPython.display import Image
from sklearn.compose import make_column_transformer
from sklearn.model_selection import train_test_split
from  sklearn.metrics  import accuracy_score
from sklearn.metrics import confusion_matrix
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:
```
#loading titanic dataset
df = pd.read_csv("titanic.csv")
```

In [ ]:
```
df
```

Out[ ]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	F
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0
...	...	...	...	...	...	...	...	...	...	
886	887	0	2	Montvila, Rev. Juozas	male	27.0	0	0	211536	13.0
887	888	1	1	Graham, Miss. Margaret Edith	female	19.0	0	0	112053	30.0
888	889	0	3	Johnston, Miss. Catherine Helen "Carrie"	female	NaN	1	2	W./C. 6607	23.4
889	890	1	1	Behr, Mr. Karl Howell	male	26.0	0	0	111369	30.0
890	891	0	3	Dooley, Mr. Patrick	male	32.0	0	0	370376	7.7

891 rows × 12 columns

In [ ]:

```
df.describe()
```

Out[ ]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	F
count	891.000000	891.000000	891.000000	714.000000	891.000000	891.000000	891.000
mean	446.000000	0.383838	2.308642	29.699118	0.523008	0.381594	32.204
std	257.353842	0.486592	0.836071	14.526497	1.102743	0.806057	49.693
min	1.000000	0.000000	1.000000	0.420000	0.000000	0.000000	0.000
25%	223.500000	0.000000	2.000000	20.125000	0.000000	0.000000	7.910
50%	446.000000	0.000000	3.000000	28.000000	0.000000	0.000000	14.454
75%	668.500000	1.000000	3.000000	38.000000	1.000000	0.000000	31.000
max	891.000000	1.000000	3.000000	80.000000	8.000000	6.000000	512.329

In [ ]:

```
#dropping unnecessary values such as PassengerID, Name and Ticket
drop_elements = ['PassengerId', 'Name', 'Ticket']
df = df.drop(drop_elements, axis = 1)
```

In [ ]:

```
#checking null values in the dataset
df.isnull().sum()
```

Out[ ]:

```
Survived      0
Pclass        0
Sex           0
Age         177
SibSp         0
Parch         0
Fare          0
Cabin       687
Embarked      2
dtype: int64
```

In [ ]:

```
#filling age and embarked null values
cols = ['Pclass', 'Sex']
age_class_sex = df.groupby(cols)['Age'].mean().reset_index()
df['Age'] = df['Age'].fillna(df[cols].reset_index().merge(age_class_sex, h

df['Embarked'] = df['Embarked'].fillna('S')
```

In [ ]:
```
#converting data attributes into categorial numerical form
df['Cabin'] = df["Cabin"].apply(lambda x: 0 if type(x) == float else 1)
df['Embarked'] = df['Embarked'].map( {'S': 0, 'C': 1, 'Q': 2} ).astype(int
df['Sex'] = df['Sex'].map( {'female': 0, 'male': 1} ).astype(int)

df.loc[ df['Fare'] <= 7.91, 'Fare'] = 0
df.loc[(df['Fare'] > 7.91) & (df['Fare'] <= 14.454), 'Fare'] = 1
df.loc[(df['Fare'] > 14.454) & (df['Fare'] <= 31), 'Fare']   = 2
df.loc[ df['Fare'] > 31, 'Fare'] = 3
df['Fare'] = df['Fare'].astype(int)

df.loc[ df['Age'] <= 16, 'Age'] = 0
df.loc[(df['Age'] > 16) & (df['Age'] <= 32), 'Age'] = 1
df.loc[(df['Age'] > 32) & (df['Age'] <= 48), 'Age'] = 2
df.loc[(df['Age'] > 48) & (df['Age'] <= 64), 'Age'] = 3
df.loc[ df['Age'] > 64, 'Age'] = 4;
df['Age'] = df['Age'].astype(int)
```

In [ ]:
```
#final cleaned dataset
df
```

Out[ ]:

	Survived	Pclass	Sex	Age	SibSp	Parch	Fare	Cabin	Embarked
0	0	3	1	1	1	0	0	0	0
1	1	1	0	2	1	0	3	1	1
2	1	3	0	1	0	0	1	0	0
3	1	1	0	2	1	0	3	1	0
4	0	3	1	2	0	0	1	0	0
...	...	...	...	...	...	...	...	...	...
886	0	2	1	1	0	0	1	0	0
887	1	1	0	1	0	0	2	1	0
888	0	3	0	1	1	2	2	0	0
889	1	1	1	1	0	0	2	1	1
890	0	3	1	1	0	0	0	0	2

891 rows × 9 columns

In [ ]:
```
y = df['Survived']
x = df.drop(['Survived'], axis=1).values
x_features = df.iloc[:,1:]
```

In [ ]:
```
#split data into train and test
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.33, r
```

In [ ]:
```
#train the decision tree classifier
dt=DecisionTreeClassifier()
dt.fit(x_train,y_train)
```

Out[ ]:
```
DecisionTreeClassifier(ccp_alpha=0.0, class_weight=None, criterion='gini',
                       max_depth=None, max_features=None, max_leaf_nodes=No
ne,
                       min_impurity_decrease=0.0, min_impurity_split=None,
                       min_samples_leaf=1, min_samples_split=2,
                       min_weight_fraction_leaf=0.0, presort='deprecated',
                       random_state=None, splitter='best')
```

In [ ]:
```
#predicting the y values from the test data
y_pred = dt.predict(x_test)
```

In [ ]:
```
print("Accuracy:",accuracy_score(y_test,y_pred))
```

```
Accuracy: 0.7661016949152543
```

In [ ]:
```
#comparision of Actual and Predicted values
res = pd.DataFrame(list(zip(y_test, y_pred)), columns =['Actual', 'Predicte
res.head(100)
```

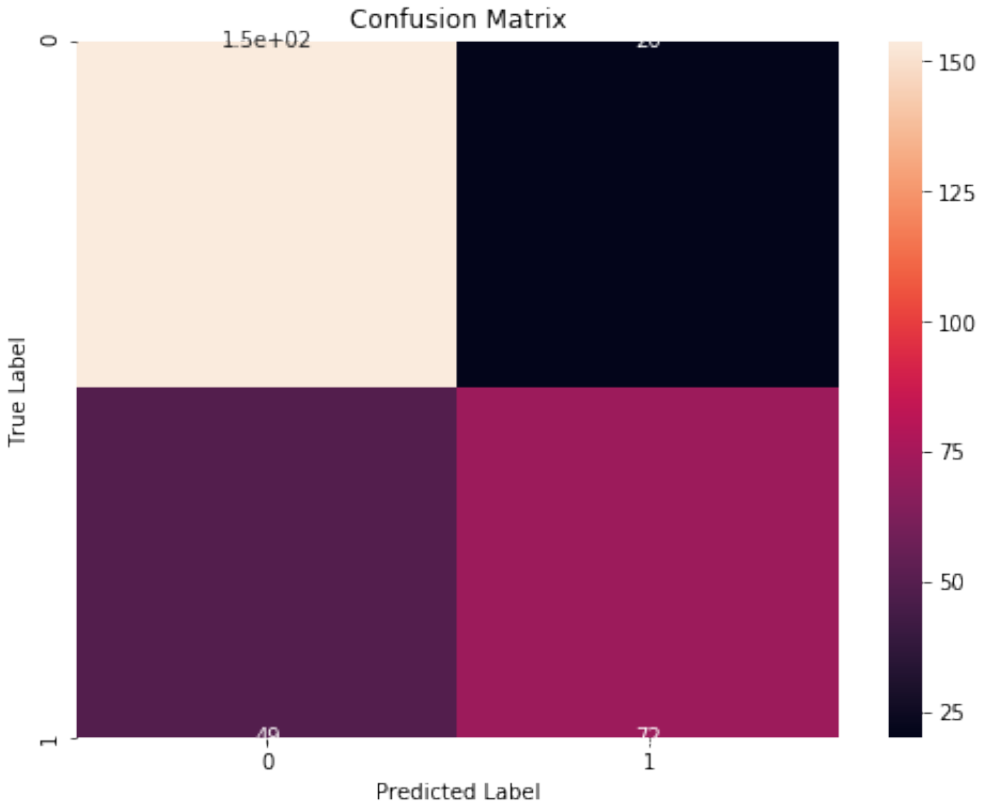
Out[ ]:

	Actual	Predicted
0	1	1
1	0	0
2	1	1
3	0	1
4	1	1
...	...	...
95	0	1
96	0	0
97	1	1
98	0	0
99	0	0

100 rows × 2 columns

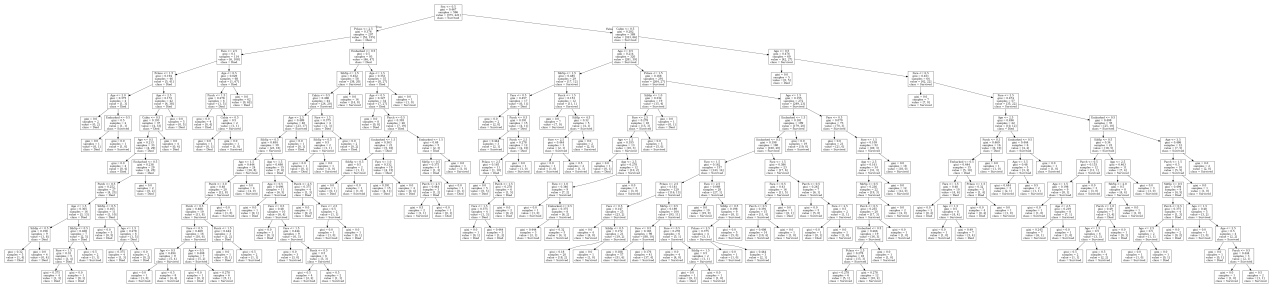
In [ ]:
```
#Confusion Matrix
conf_matrix = confusion_matrix(y_test, y_pred)
fig, ax = plt.subplots(figsize=(8,6))
sns.heatmap(conf_matrix,annot=True,cbar=True)
plt.ylabel('True Label')
plt.xlabel('Predicted Label')
plt.title('Confusion Matrix')
conf_matrix
```

Out[ ]:
```
array([[154,  20],
       [ 49,  72]])
```



In [ ]:
```
export_graphviz(dt,out_file="data.dot",feature_names=x_features.columns,cla
!dot -Tpng data.dot -o tree1.png
Image("tree1.png")
```

Out[ ]:



In [ ]: