In [1]:
```
import pandas as pd
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split

from sklearn.preprocessing import StandardScaler
```

In [2]:
```
from sklearn.ensemble import RandomForestClassifier
import matplotlib.pyplot as plt
from sklearn.model_selection import GridSearchCV
from sklearn.tree import plot_tree
```

In [3]:
```
df=pd.read_csv("C2_test.gender_submission.csv")
df1=pd.read_csv("C2_train.gender_submission.csv")
```

In [4]:
```
df_=df.drop(["Cabin","Name","Embarked","Ticket","PassengerId","Sex"],axis=1)
df1_=df1.drop(["Survived","Cabin","Name","Embarked","Ticket","PassengerId"],axis=1)
print(df_)
print(df1_)
```

```
     Pclass   Age  SibSp  Parch      Fare
0         3  34.5      0      0    7.8292
1         3  47.0      1      0    7.0000
2         2  62.0      0      0    9.6875
3         3  27.0      0      0    8.6625
4         3  22.0      1      1   12.2875
..      ...   ...    ...    ...       ...
413       3   NaN      0      0    8.0500
414       1  39.0      0      0  108.9000
415       3  38.5      0      0    7.2500
416       3   NaN      0      0    8.0500
417       3   NaN      1      1   22.3583

[418 rows x 5 columns]
     Pclass     Sex   Age  SibSp  Parch     Fare
0         3    male  22.0      1      0   7.2500
1         1  female  38.0      1      0  71.2833
2         3  female  26.0      0      0   7.9250
3         1  female  35.0      1      0  53.1000
4         3    male  35.0      0      0   8.0500
..      ...     ...   ...    ...    ...      ...
886       2    male  27.0      0      0  13.0000
887       1  female  19.0      0      0  30.0000
888       3  female   NaN      1      2  23.4500
889       1    male  26.0      0      0  30.0000
890       3    male  32.0      0      0   7.7500

[891 rows x 6 columns]
```

In [5]:

```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 891 entries, 0 to 890
Data columns (total 12 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   PassengerId  891 non-null    int64  
 1   Survived     891 non-null    int64  
 2   Pclass       891 non-null    int64  
 3   Name         891 non-null    object 
 4   Sex          891 non-null    object 
 5   Age          714 non-null    float64
 6   SibSp        891 non-null    int64  
 7   Parch        891 non-null    int64  
 8   Ticket       891 non-null    object 
 9   Fare         891 non-null    float64
 10  Cabin        204 non-null    object 
 11  Embarked     889 non-null    object 
dtypes: float64(2), int64(5), object(5)
memory usage: 83.7+ KB
```

In [6]:

```
df_=df_.dropna()
df1_=df1_.dropna()
df1_.info()
df_.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 714 entries, 0 to 890
Data columns (total 6 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Pclass  714 non-null    int64  
 1   Sex     714 non-null    object 
 2   Age     714 non-null    float64
 3   SibSp   714 non-null    int64  
 4   Parch   714 non-null    int64  
 5   Fare    714 non-null    float64
dtypes: float64(2), int64(3), object(1)
memory usage: 39.0+ KB
<class 'pandas.core.frame.DataFrame'>
Int64Index: 331 entries, 0 to 415
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype  
---  ------  --------------  -----  
 0   Pclass  331 non-null    int64  
 1   Age     331 non-null    float64
 2   SibSp   331 non-null    int64  
 3   Parch   331 non-null    int64  
 4   Fare    331 non-null    float64
dtypes: float64(2), int64(3)
memory usage: 15.5 KB
```

In [7]:
```
y=df1_["Sex"]
x=df1_.drop(["Sex"],axis=1)
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
# f=StandardScaler().fit_transform(x)
# lo=LogisticRegression()
# lo.fit(f,y)
```

In [ ]:
```
# lo.predict(df_)
```

In [ ]:
```
# obs=[[1,23,1,1,3232]]
# lo.predict(obs)
```

In [ ]:
```
# lo.predict_proba(obs)
```

In [18]:
```
rfc=RandomForestClassifier()
rfc.fit(x_train,y_train)
```

Out[18]:
```
RandomForestClassifier()
```

In [12]:
```
parameter={'max_depth':[1,2,3,4,5],
          "min_samples_leaf":[5,10,15,20,25],
          "n_estimators":[10,20,30,40,50]}
```

In [13]:
```
grid_search = GridSearchCV(estimator=rfc,param_grid=parameter,cv=2,scoring="accurac
grid_search.fit(x_train,y_train)
```

Out[13]:
```
GridSearchCV(cv=2, estimator=RandomForestClassifier(),
             param_grid={'max_depth': [1, 2, 3, 4, 5],
                         'min_samples_leaf': [5, 10, 15, 20, 25],
                         'n_estimators': [10, 20, 30, 40, 50]},
             scoring='accuracy')
```

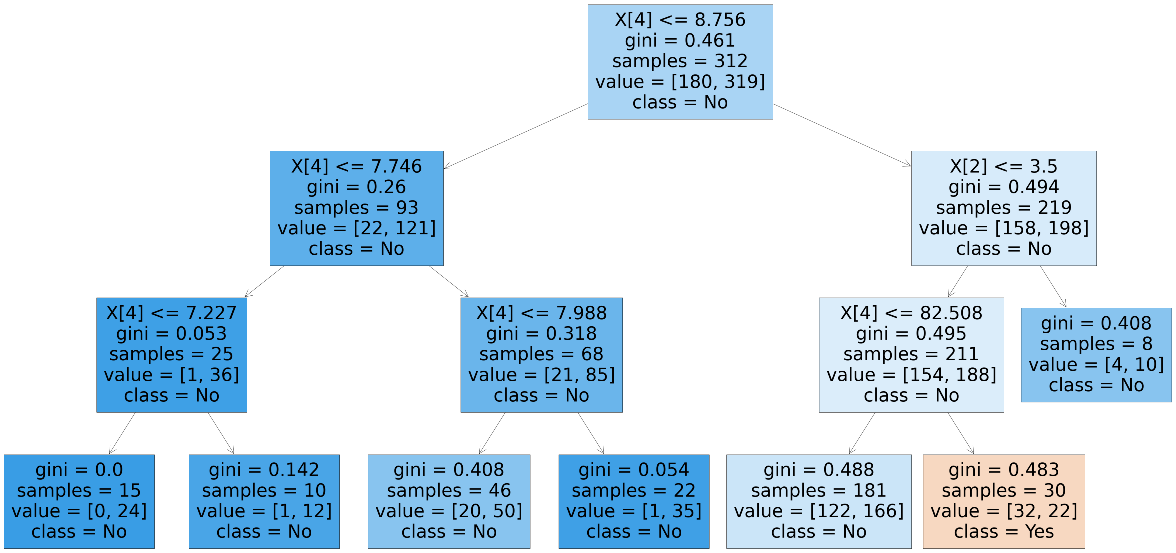
In [14]:
```
grid_search.best_score_
```

Out[14]:
```
0.6653654618473896
```

In [16]:
```
rfc_best=grid_search.best_estimator_
```

```
In [17]: plt.figure(figsize=(80,40))
         plot_tree(rfc_best.estimators_[5],class_names=['Yes','No','Yes'],filled=True)
```

```
Out[17]: [Text(2575.3846153846152, 1902.6000000000001, 'X[4] <= 8.756\ngini = 0.461\nsample
         s = 312\nvalue = [180, 319]\nclass = No'),
          Text(1373.5384615384614, 1359.0, 'X[4] <= 7.746\ngini = 0.26\nsamples = 93\nvalue
         = [22, 121]\nclass = No'),
          Text(686.7692307692307, 815.4000000000001, 'X[4] <= 7.227\ngini = 0.053\nsamples
         = 25\nvalue = [1, 36]\nclass = No'),
          Text(343.38461538461536, 271.79999999999995, 'gini = 0.0\nsamples = 15\nvalue =
         [0, 24]\nclass = No'),
          Text(1030.1538461538462, 271.79999999999995, 'gini = 0.142\nsamples = 10\nvalue =
         [1, 12]\nclass = No'),
          Text(2060.3076923076924, 815.4000000000001, 'X[4] <= 7.988\ngini = 0.318\nsamples
         = 68\nvalue = [21, 85]\nclass = No'),
          Text(1716.9230769230767, 271.79999999999995, 'gini = 0.408\nsamples = 46\nvalue =
         [20, 50]\nclass = No'),
          Text(2403.6923076923076, 271.79999999999995, 'gini = 0.054\nsamples = 22\nvalue =
         [1, 35]\nclass = No'),
          Text(3777.230769230769, 1359.0, 'X[2] <= 3.5\ngini = 0.494\nsamples = 219\nvalue
         = [158, 198]\nclass = No'),
          Text(3433.8461538461534, 815.4000000000001, 'X[4] <= 82.508\ngini = 0.495\nsample
         s = 211\nvalue = [154, 188]\nclass = No'),
          Text(3090.461538461538, 271.79999999999995, 'gini = 0.488\nsamples = 181\nvalue =
         [122, 166]\nclass = No'),
          Text(3777.230769230769, 271.79999999999995, 'gini = 0.483\nsamples = 30\nvalue =
         [32, 22]\nclass = Yes'),
          Text(4120.615384615385, 815.4000000000001, 'gini = 0.408\nsamples = 8\nvalue =
         [4, 10]\nclass = No')]
```



```
In [ ]: 
```