In [230]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import sklearn as sk
from sklearn.preprocessing  import OneHotEncoder
from sklearn.compose import make_column_transformer
from sklearn.model_selection import cross_val_score
from sklearn.pipeline import make_pipeline
from sklearn.neighbors import KNeighborsClassifier
from sklearn import metrics
```

In [231]:
```
train_df = pd.read_csv('C:/Users/Dell/Desktop/Titanic/train.csv')
test_df = pd.read_csv('C:/Users/Dell/Desktop/Titanic/test.csv')
```

In [232]:
```
test_df.head()
```

Out[232]:

	PassengerId	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarke
0	892	3	Kelly, Mr. James	male	34.5	0	0	330911	7.8292	NaN	
1	893	3	Wilkes, Mrs. James (Ellen Needs)	female	47.0	1	0	363272	7.0000	NaN	
2	894	2	Myles, Mr. Thomas Francis	male	62.0	0	0	240276	9.6875	NaN	
3	895	3	Wirz, Mr. Albert	male	27.0	0	0	315154	8.6625	NaN	
4	896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)	female	22.0	1	1	3101298	12.2875	NaN	

In [255]:
```
test_df.shape
```

Out[255]:
```
(418, 11)
```

In [233]:
```
train_df.head()
```

Out[233]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabi
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	Na
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C8
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	Na
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C12
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	Na

In [234]:
```
train_df.tail()
```

Out[234]:

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin
886	*887*	*0*	*2*	*Montvila, Rev. Juozas*	*male*	*27.0*	*0*	*0*	*211536*	*13.00*	*NaN*
887	*888*	*1*	*1*	*Graham, Miss. Margaret Edith*	*female*	*19.0*	*0*	*0*	*112053*	*30.00*	*B42*
888	*889*	*0*	*3*	*Johnston, Miss. Catherine Helen "Carrie"*	*female*	*NaN*	*1*	*2*	*W./C. 6607*	*23.45*	*NaN*
889	*890*	*1*	*1*	*Behr, Mr. Karl Howell*	*male*	*26.0*	*0*	*0*	*111369*	*30.00*	*C148*
890	*891*	*0*	*3*	*Dooley, Mr. Patrick*	*male*	*32.0*	*0*	*0*	*370376*	*7.75*	*NaN*

In [235]:
```
train_df.describe()
```

Out[235]:

	PassengerId	Survived	Pclass	Age	SibSp	Parch	Fare
count	*891.000000*	*891.000000*	*891.000000*	*714.000000*	*891.000000*	*891.000000*	*891.000000*
mean	*446.000000*	*0.383838*	*2.308642*	*29.699118*	*0.523008*	*0.381594*	*32.204208*
std	*257.353842*	*0.486592*	*0.836071*	*14.526497*	*1.102743*	*0.806057*	*49.693429*
min	*1.000000*	*0.000000*	*1.000000*	*0.420000*	*0.000000*	*0.000000*	*0.000000*
25%	*223.500000*	*0.000000*	*2.000000*	*20.125000*	*0.000000*	*0.000000*	*7.910400*
50%	*446.000000*	*0.000000*	*3.000000*	*28.000000*	*0.000000*	*0.000000*	*14.454200*
75%	*668.500000*	*1.000000*	*3.000000*	*38.000000*	*1.000000*	*0.000000*	*31.000000*
max	*891.000000*	*1.000000*	*3.000000*	*80.000000*	*8.000000*	*6.000000*	*512.329200*

In [236]:
```
train_df.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 [237]:
```
train_df.isnull().sum()
```

Out[237]:
```
PassengerId      0
Survived         0
Pclass           0
Name             0
Sex              0
Age            177
SibSp            0
Parch            0
Ticket           0
Fare             0
Cabin          687
Embarked         2
dtype: int64
```

In [238]:
```
train_df = train_df.dropna(axis=0, subset=['Embarked'])
```

In [239]:
```
X = train_df[['Pclass','Sex','Embarked']]
y = train_df.Survived
```

In [240]:
```
X.shape
```

Out[240]:
```
(889, 3)
```

In [241]:
```
y.shape
```

Out[241]:
```
(889,)
```

In [242]:
```
X.head()
```

Out[242]:

	Pclass	Sex	Embarked
0	3	male	S
1	1	female	C
2	3	female	S
3	1	female	S
4	3	male	S

In [243]:
```
y_test = test_df[['Pclass','Sex','Embarked']]
column_trans_test = make_column_transformer((OneHotEncoder(), ['Sex', 'Embarked']
column_trans_test.fit_transform(y_test)
```

Out[243]:
```
array([[0., 1., 0., 1., 0., 3.],
       [1., 0., 0., 0., 1., 3.],
       [0., 1., 0., 1., 0., 2.],
       ...,
       [0., 1., 0., 0., 1., 3.],
       [0., 1., 0., 0., 1., 3.],
       [0., 1., 1., 0., 0., 3.]])
```

In [244]:
```
column_trans = make_column_transformer((OneHotEncoder(), ['Sex', 'Embarked']), re
```

In [245]:
```
column_trans.fit_transform(X)
```

Out[245]:
```
array([[0., 1., 0., 0., 1., 3.],
       [1., 0., 1., 0., 0., 1.],
       [1., 0., 0., 0., 1., 3.],
       ...,
       [1., 0., 0., 0., 1., 3.],
       [0., 1., 1., 0., 0., 1.],
       [0., 1., 0., 1., 0., 3.]])
```

In [246]:
```
knn = KNeighborsClassifier(n_neighbors = 5)
```

In [247]:
```
pipe = make_pipeline(column_trans, knn)
```

In [248]:
```
cross_val_score(pipe, X, y, cv = 10, scoring='accuracy').mean()
```

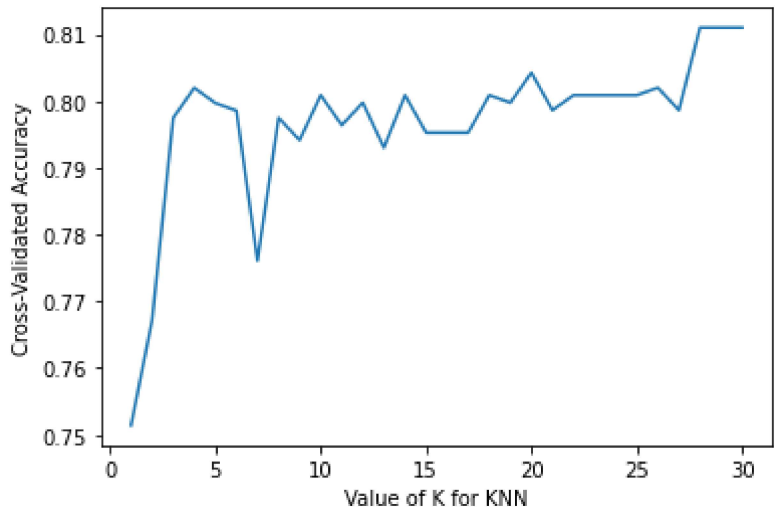
Out[248]:
```
0.7997063329928498
```

In [249]:
```
k_range = list(range(1,31))
k_scores = []
for k in k_range:
    knn = KNeighborsClassifier(n_neighbors = k)
    pipe = make_pipeline(column_trans, knn)
    scores_mean = cross_val_score(pipe, X, y, cv = 10, scoring='accuracy').mean()
    k_scores.append(scores_mean)
print(k_scores)
```

```
[0.7514300306435138, 0.7671859039836569, 0.7974846782431052, 0.801991828396322
9, 0.7997063329928498, 0.7985827374872317, 0.7761108273748722, 0.79749744637385
09, 0.7941521961184883, 0.8008937691521961, 0.7963993871297241, 0.7997701736465
78, 0.7930286006128702, 0.8008937691521961, 0.7952757916241062, 0.7952757916241
062, 0.7952757916241062, 0.8008937691521961, 0.799770173646578, 0.8042645556690
5, 0.7986465781409601, 0.8008937691521961, 0.8008937691521961, 0.80089376915219
61, 0.8008937691521961, 0.802017364657814, 0.7986465781409601, 0.81100612870275
79, 0.8110061287027579, 0.8110061287027579]
```

In [250]:
```
plt.plot(k_range, k_scores)
plt.xlabel('Value of K for KNN')
plt.ylabel('Cross-Validated Accuracy')
```

Out[250]:
```
Text(0, 0.5, 'Cross-Validated Accuracy')
```



In [251]:
```
knn = KNeighborsClassifier(n_neighbors = 30)
pipe = make_pipeline(column_trans, knn)
cross_val_score(pipe, X, y, cv = 10, scoring='accuracy').mean()
```

Out[251]:
```
0.8110061287027579
```

In [252]:
```
pipe.fit(X,y)
```

Out[252]:
```
Pipeline(steps=[('columntransformer',
                 ColumnTransformer(remainder='passthrough',
                                   transformers=[('onehotencoder',
                                                  OneHotEncoder(),
                                                  ['Sex', 'Embarked'])])),
                ('kneighborsclassifier', KNeighborsClassifier(n_neighbors=3
0))])
```

In [258]:
```
y_test_pred = pipe.predict(y_test)
y_test_pred
```

Out[258]:
```
array([0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0,
       1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1,
       1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1,
       1, 0, 0, 1, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0,
       1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0,
       0, 1, 1, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0,
       0, 0, 1, 0, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1,
       1, 0, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 1, 0, 0, 1, 0, 1, 0,
       1, 0, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1,
       0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0,
       0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0,
       0, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0,
       1, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0,
       0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0,
       1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1,
       0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0],
      dtype=int64)
```

In [260]:
```
y_test_pred.shape
```

Out[260]:
```
(418,)
```

In [264]:
```
outcome = pd.DataFrame(y_test_pred)
pass_id = pd.read_csv('test.csv')[['PassengerId']]
result = pd.concat([pass_id,outcome], axis=1)
result.columns = ['PassengerId','Survived']
result.to_csv('result.csv',encoding='utf-8', columns=['PassengerId','Survived'],
```