Import Libraries

In [2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn import metrics
from sklearn.neighbors import KNeighborsClassifier
```

load dataset

In [3]:
```
df = pd.read_csv('diabetes.csv')
df.head()
```

Out[3]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

In [4]:
```
df.shape
```

Out[4]:
```
(768, 9)
```

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               768 non-null    int64  
 1   Glucose                   768 non-null    int64  
 2   BloodPressure             768 non-null    int64  
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
 8   Outcome                   768 non-null    int64  
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

In [6]:
```
df.describe()
```

Out[6]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000	768.000000
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.992578	0.471876	33.240885	0.348958
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.884160	0.331329	11.760232	0.476951
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.078000	21.000000	0.000000
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.300000	0.243750	24.000000	0.000000
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.000000	0.372500	29.000000	0.000000
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.600000	0.626250	41.000000	1.000000
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.100000	2.420000	81.000000	1.000000

In [7]:
```
# seperate out features and target value from dataset

X = df.drop(['Outcome'],axis = 1).values
y = df['Outcome'].values
```

In [9]:
```
X.shape
```

Out[9]:
```
(768, 8)
```

In [11]:
```
y.shape
```

Out[11]:
```
(768,)
```

In [12]:
```
# split the data in training and testing set

X_train, X_test, y_train,y_test = train_test_split(X,y, test_size = 0.3, random_state = 42)
```

In [13]:
```
print("X_train shape : " , X_train.shape)
print("X_test shape : " , X_test.shape)
print("y_train shape : " , y_train.shape)
print("y_test shape : " , y_test.shape)
```

```
X_train shape :  (537, 8)
X_test shape :  (231, 8)
y_train shape :  (537,)
y_test shape :  (231,)
```

In [15]:
```
# consider diff values of k
np.arange(1,10)
```

Out[15]:
```
array([1, 2, 3, 4, 5, 6, 7, 8, 9])
```

In [16]:

In [20]:
```
# single value of k

# set up a model
knn = KNeighborsClassifier(n_neighbors = 3)

# fit the model
knn.fit(X_train,y_train)

# compute accuracy on training set
acc_k3_train = knn.score(X_train,y_train)
print("Training data accuracy : ",acc_k3_train)

# Compute accuracy on testing set
acc_k3_test = knn.score(X_test,y_test)
print("Testing data accuracy : ",acc_k3_test)
```

```
Training data accuracy :  0.8435754189944135
Testing data accuracy :  0.6753246753246753
```

In [21]:
```
# multiple value of K

neighbors = np.arange(1,10)
train_accuracy = np.empty(len(neighbors))
test_accuracy = np.empty(len(neighbors))
```

In [25]:
```
neighbors
```

Out[25]:
```
array([1, 2, 3, 4, 5, 6, 7, 8, 9])
```

In [31]:
```
for i,k in enumerate(neighbors):
    # set up a model
    knn = KNeighborsClassifier(n_neighbors = k)

    # fit the model
    knn.fit(X_train,y_train)

    # compute accuracy on training set
    train_accuracy[i] = knn.score(X_train,y_train)

    # Compute accuracy on testing set
    test_accuracy[i] = knn.score(X_test,y_test)
```

In [27]:
```
train_accuracy
```

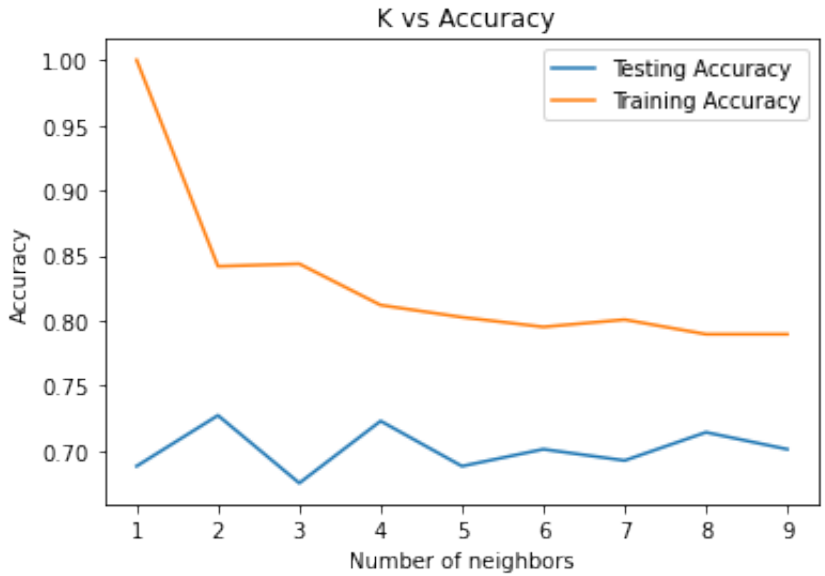
Out[27]:
```
array([1.        , 0.84171322, 0.84357542, 0.81191806, 0.80260708,
       0.79515829, 0.80074488, 0.78957169, 0.78957169])
```

In [28]:
```
test_accuracy
```

Out[28]:
```
array([0.68831169, 0.72727273, 0.67532468, 0.72294372, 0.68831169,
       0.7012987 , 0.69264069, 0.71428571, 0.7012987 ])
```

In [29]:
```
# plot train and test accuracy

plt.plot(neighbors,test_accuracy,label = "Testing Accuracy")
plt.plot(neighbors,train_accuracy,label = "Training Accuracy")
plt.legend()
plt.xlabel("Number of neighbors")
plt.ylabel("Accuracy")
plt.title(" K vs Accuracy")
plt.show()
```



In [32]:
```
# set up knn classifier with k = 4

# single value of k

# set up a model
knn = KNeighborsClassifier(n_neighbors = 4)

# fit the model
knn.fit(X_train,y_train)

# Compute accuracy on testing set
score = knn.score(X_test,y_test)
print("accuracy : ",score)
```

```
accuracy :  0.7229437229437229
```

In [33]:
```
# predicting values

y_pred = knn.predict(X_test)
y_pred
```

Out[33]:
```
array([0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0,
       0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1,
       0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0,
       0, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0,
       0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 1,
       0, 1, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 0,
       0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 1, 1, 0,
       0, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0,
       0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 1, 0, 1,
       1, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0])
```

In [34]:
```
y_pred.shape
```

Out[34]:
```
(231,)
```

In [ ]: