In [ ]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.metrics import accuracy_score
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
```

In [ ]:
```
df=pd.read_csv("teleCust1000t.csv",sep=',')
df.head()
```

Out[ ]:

	region	tenure	age	marital	address	income	ed	employ	retire	gender	reside	custcat
0	2	13	44	1	9	64.0	4	5	0.0	0	2	1
1	3	11	33	1	7	136.0	5	5	0.0	0	6	4
2	3	68	52	1	24	116.0	1	29	0.0	1	2	3
3	2	33	33	0	12	33.0	2	0	0.0	1	1	1
4	2	23	30	1	9	30.0	1	2	0.0	0	4	3

In [ ]:
```
X = df.drop(columns=["custcat"])
y = df["custcat"]
```

In [ ]:
```
X_train, X_test, y_train, y_test = train_test_split( X, y, test_size=0.2)
```

In [ ]:
```
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

In [ ]:
```
knn_classifier = KNeighborsClassifier(n_neighbors=2)
knn_classifier.fit(X_train,y_train)
y_pred = knn_classifier.predict(X_test)
```

In [ ]:
```
accuracy_score(y_test, y_pred)
```

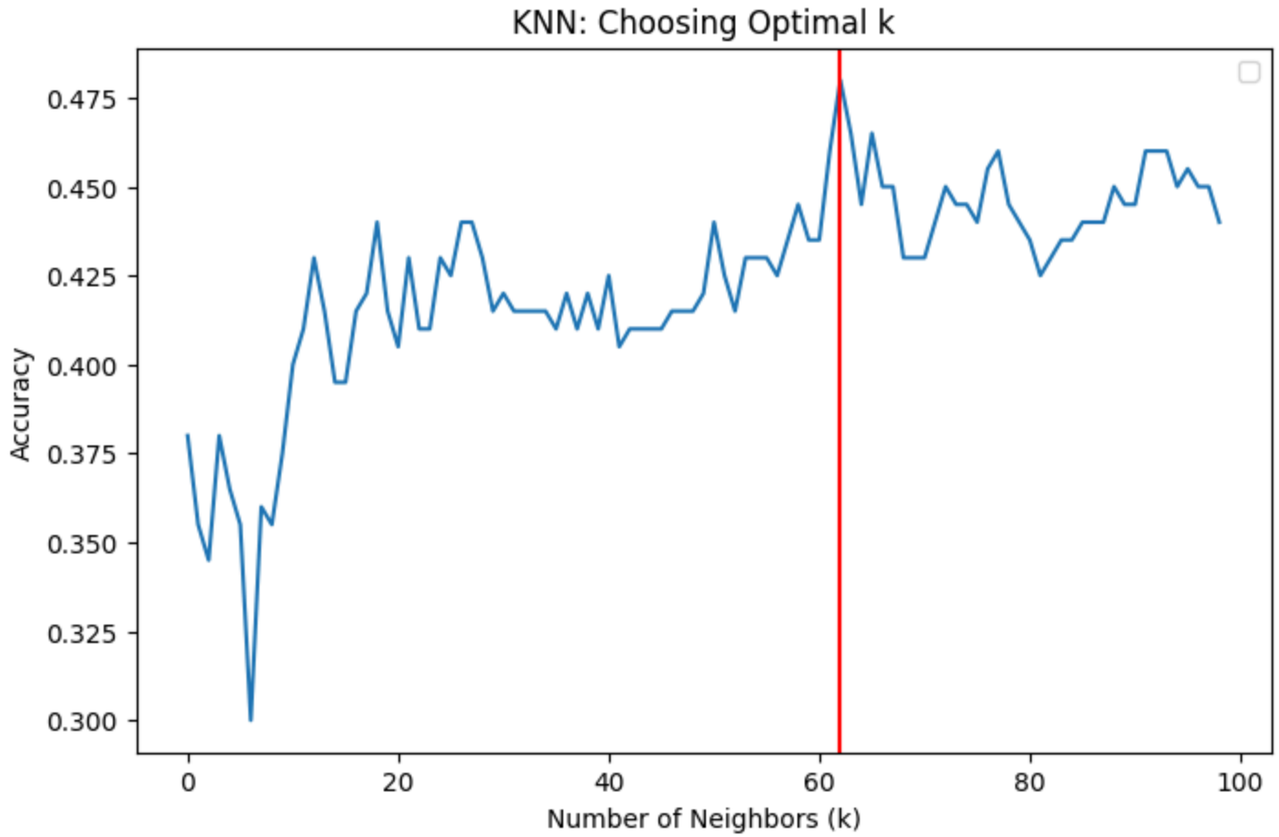
Out[ ]: 0.355

In [ ]:
```
accuracy_scores = []
for n in range(1, 100):
    knn_classifier = KNeighborsClassifier(n_neighbors=n)  # Use n here
    knn_classifier.fit(X_train, y_train)
    y_pred = knn_classifier.predict(X_test)
    acc = accuracy_score(y_test, y_pred)
    accuracy_scores.append(acc)
    #

optimal_k = [np.argmax(accuracy_scores)]
best_accuracy = max(accuracy_scores)
best_accuracy
```

Out[ ]: 0.48

In [ ]:
```
plt.figure(figsize=(8, 5))
plt.plot( accuracy_scores)
plt.xlabel("Number of Neighbors (k)")
plt.ylabel("Accuracy")
plt.title("KNN: Choosing Optimal k")
plt.axvline(optimal_k, color='r')
plt.legend()
plt.show()

print(f"Optimal k: {optimal_k} with Highest Accuracy: {best_accuracy:.4f}")
```

```
C:\Users\Asus\AppData\Local\Temp\ipykernel_4240\2486896895.py:7: UserWarning: No artists with labels found to put in legend.  Note that artists whose label st
art with an underscore are ignored when legend() is called with no argument.
  plt.legend()
```




```
Optimal k: [np.int64(62)] with Highest Accuracy: 0.4800
```