Implement K-Means clustering on sales_data_sample.csv dataset. Determine the number of clusters using the elbow method. Dataset link : https://www.kaggle.com/datasets/kyanyoga/sample-sales-data

In [2]:
```
import pandas as pd
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
import matplotlib.pyplot as plt
```

In [3]:
```
# Try reading the file with different encodings if 'utf-8' doesn't work
# ISO-8859-1 or 'latin1' is often a good fallback for non-UTF-8 files
data = pd.read_csv("C:/Users/Atharva/OneDrive/Desktop/LP3 code/sales_data_sample.csv", encoding='ISO-8859-1')

# Display the first few rows of the dataset to check if it's loaded correctly
print(data.head())
```

```
   ORDERNUMBER  QUANTITYORDERED  PRICEEACH  ORDERLINENUMBER    SALES  \
0        10107               30      95.70                2  2871.00
1        10121               34      81.35                5  2765.90
2        10134               41      94.74                2  3884.34
3        10145               45      83.26                6  3746.70
4        10159               49     100.00               14  5205.27

         ORDERDATE   STATUS  QTR_ID  MONTH_ID  YEAR_ID  ...  \
0   2/24/2003 0:00  Shipped       1         2     2003  ...
1    5/7/2003 0:00  Shipped       2         5     2003  ...
2    7/1/2003 0:00  Shipped       3         7     2003  ...
3   8/25/2003 0:00  Shipped       3         8     2003  ...
4  10/10/2003 0:00  Shipped       4        10     2003  ...

                   ADDRESSLINE1  ADDRESSLINE2           CITY STATE  \
0        897 Long Airport Avenue          NaN            NYC    NY
1             59 rue de l'Abbaye          NaN          Reims   NaN
2  27 rue du Colonel Pierre Avia          NaN          Paris   NaN
3             78934 Hillside Dr.          NaN       Pasadena    CA
4                7734 Strong St.          NaN  San Francisco    CA

  POSTALCODE COUNTRY TERRITORY CONTACTLASTNAME CONTACTFIRSTNAME DEALSIZE
0      10022     USA       NaN              Yu             Kwai    Small
1      51100  France      EMEA         Henriot             Paul    Small
2      75508  France      EMEA        Da Cunha           Daniel   Medium
3      90003     USA       NaN           Young            Julie   Medium
4        NaN     USA       NaN           Brown            Julie   Medium

[5 rows x 25 columns]
```

In [4]:
```
# Select relevant numeric features for clustering
# Here, we're using only QUANTITYORDERED, PRICEEACH, and SALES columns for demonstration
# You may choose other columns as per the analysis needs
numeric_data = data[['QUANTITYORDERED', 'PRICEEACH', 'SALES']]
```

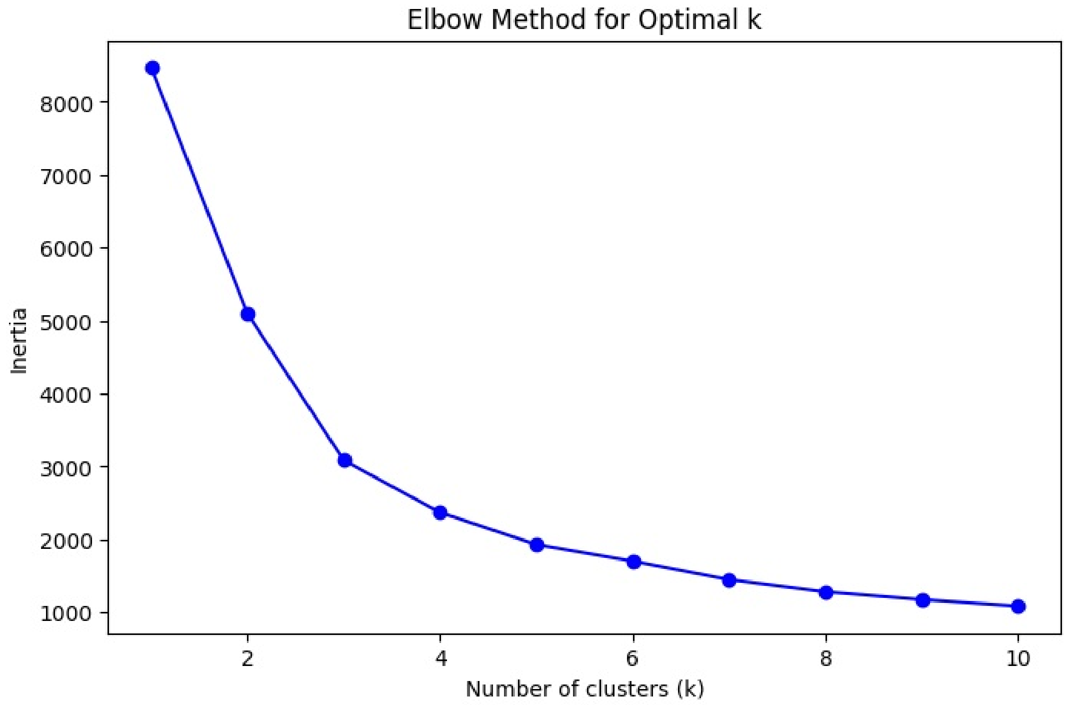
In [5]:
```
# Handle missing values (if any) by dropping rows with NaN values
numeric_data = numeric_data.dropna()
```

In [6]:
```
# Scale the features for K-Means clustering
scaler = StandardScaler()
scaled_data = scaler.fit_transform(numeric_data)
```

In [7]:
```
# Determine the optimal number of clusters using the elbow method
inertia = []
K = range(1, 11)  # Check for 1 to 10 clusters

for k in K:
    kmeans = KMeans(n_clusters=k, random_state=0)
    kmeans.fit(scaled_data)
    inertia.append(kmeans.inertia_)
```

In [8]:
```
# Plot the elbow graph
plt.figure(figsize=(8, 5))
plt.plot(K, inertia, 'bo-')
plt.xlabel('Number of clusters (k)')
plt.ylabel('Inertia')
plt.title('Elbow Method for Optimal k')
plt.show()
```



In [9]:
```
# Once you've identified the elbow point (say 3 clusters), apply KMeans
optimal_k = 3  # Set this to the elbow point you observed
kmeans = KMeans(n_clusters=optimal_k, random_state=0)
kmeans.fit(scaled_data)
```

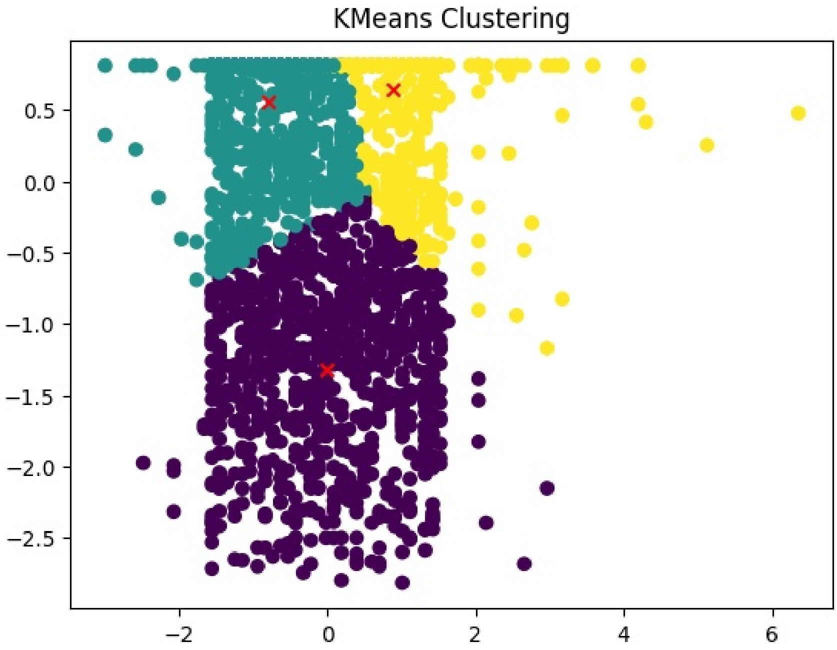
Out[9]:
```
▾          KMeans
KMeans(n_clusters=3, random_state=0)
```

In [10]:
```
print("Cluster Centers: \n", kmeans.cluster_centers_)
```

```
Cluster Centers: 
 [[ 1.14899965e-03 -1.32175214e+00 -8.41918812e-01]
 [-7.92678932e-01  5.52789374e-01 -2.55710107e-01]
 [ 8.95650592e-01  6.39987864e-01  1.09527704e+00]]
```

In [11]:
```
data['Cluster'] = kmeans.labels_  # Assign the predicted cluster labels to the original data
```

In [12]:
```
plt.scatter(scaled_data[:, 0], scaled_data[:, 1], c=kmeans.labels_, cmap='viridis')
plt.scatter(kmeans.cluster_centers_[:, 0], kmeans.cluster_centers_[:, 1], color='red', marker='x')
plt.title('KMeans Clustering')
plt.show()
```



In [ ]:

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