```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import os
for dirname, _, filenames in os.walk('/content/Wholesale customers data.csv'):
     for filename in filenames:
          print(os.path.join(dirname, filename))
```

```
import pandas as pd
# Define a function to load the data
def load_data(path):
     try:
         df = pd.read_csv(path)
         print("Data loaded successfully!")
         return df
     except Exception as e:
           print(f"An error occurred: {e}")
           return None
# Path to the data file
path = '/content/Wholesale customers data.csv'
# Load the data
df = load_data(path)
# Display the first few rows of the DataFrame
print(df.head())
```

```
Data loaded successfully!
   Channel  Region  Fresh  Milk  Grocery  Frozen  Detergents_Paper  Delicassen
0        2       3  12669  9656     7561     214              2674        1338
1        2       3   7057  9810     9568    1762              3293        1776
2        2       3   6353  8808     7684    2405              3516        7844
3        1       3  13265  1196     4221    6404               507        1788
4        2       3  22615  5410     7198    3915              1777        5185
```

```
print("Column names:")
print(df.columns)
```

```
Column names:
Index(['Channel', 'Region', 'Fresh', 'Milk', 'Grocery', 'Frozen',
       'Detergents_Paper', 'Delicassen'],
      dtype='object')
```

```
# Print the data types of each column
print("Data types:")
print(df.dtypes)
```

```
Data types:
Channel             int64
Region              int64
Fresh               int64
Milk                int64
Grocery             int64
Frozen              int64
Detergents_Paper    int64
Delicassen          int64
dtype: object
```

```
# Check for missing values
print("Missing values per column:")
print(df.isnull().sum())
```

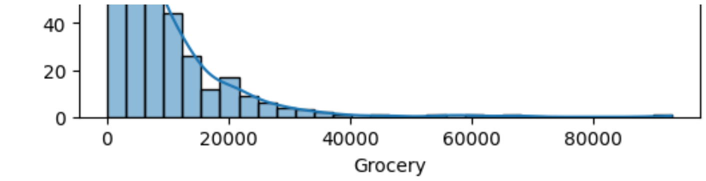
```
Missing values per column:
Channel             0
Region              0
Fresh               0
Milk                0
Grocery             0
Frozen              0
Detergents_Paper    0
Delicassen          0
dtype: int64
```

```
import matplotlib.pyplot as plt
import seaborn as sns
# Check descriptive statistics
print("Descriptive Statistics:")
print(df.describe())
# Check for duplicates
print("Number of duplicate rows: ", df.duplicated().sum())
```

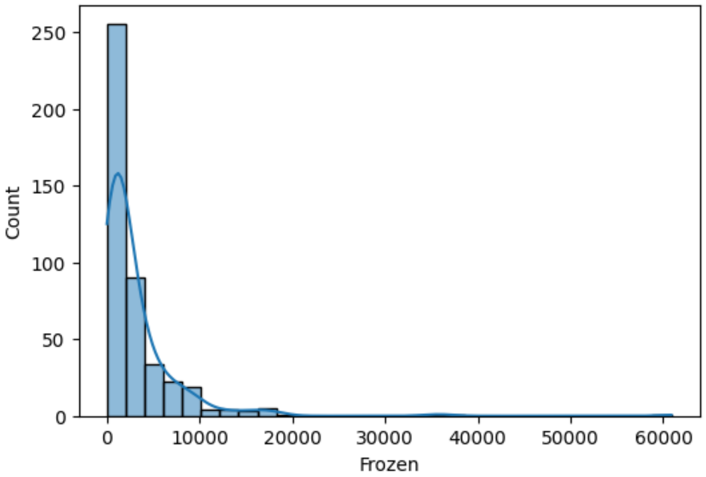
```
Descriptive Statistics:
          Channel      Region          Fresh          Milk       Grocery  \
count  440.000000  440.000000     440.000000    440.000000    440.000000   
mean     1.322727    2.543182   12000.297727   5796.265909   7951.277273   
std      0.468052    0.774272   12647.328865   7380.377175   9503.162829   
min      1.000000    1.000000       3.000000     55.000000      3.000000   
25%      1.000000    2.000000    3127.750000   1533.000000   2153.000000   
50%      1.000000    3.000000    8504.000000   3627.000000   4755.500000   
75%      2.000000    3.000000   16933.750000   7190.250000  10655.750000   
max      2.000000    3.000000  112151.000000  73498.000000  92780.000000   

             Frozen  Detergents_Paper    Delicassen  
count    440.000000        440.000000    440.000000  
mean    3071.931818       2881.493182   1524.870455  
std     4854.673333       4767.854448   2820.105937  
min       25.000000          3.000000      3.000000  
25%      742.250000        256.750000    408.250000  
50%     1526.000000        816.500000    965.500000  
75%     3554.250000       3922.000000   1820.250000  
max    60869.000000      40827.000000  47943.000000  
Number of duplicate rows:  0
```

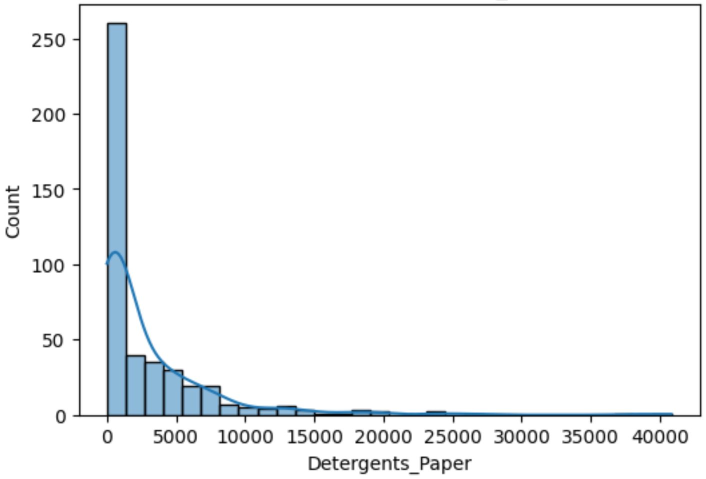
```
# Distribution plots for each feature
for column in df.columns:
    plt.figure(figsize=(6, 4))
    sns.histplot(df[column], bins=30, kde=True)
    plt.title(f'Distribution of {column}')
    plt.show()
# Heatmap for correlation between variables
plt.figure(figsize=(10, 8))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm', center=0)
plt.title('Correlation Heatmap')
plt.show()
```



Distribution of Frozen



Distribution of Detergents_Paper

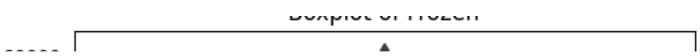


Distribution of Delicassen

300
250
200
150
100
Count

```
# checking for outliers
import seaborn as sns
import matplotlib.pyplot as plt
# Draw boxplots for all features
```

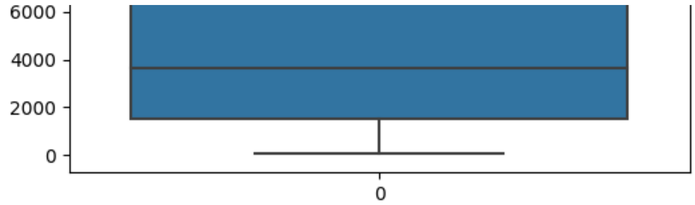
```
for column in df.columns:
    plt.figure(figsize=(6, 4))
    sns.boxplot(df[column])
    plt.title(f'Boxplot of {column}')
    plt.show()
# Function to detect outliers
def detect_outliers(dataframe, column):
     Q1 = dataframe[column].quantile(0.25)
     Q3 = dataframe[column].quantile(0.75)
     IQR = Q3 - Q1
     outliers = dataframe[(dataframe[column] < Q1 - 1.5*IQR)|(dataframe[column] > Q3 + 1.5*IQR)]
     return outliers
# Detect and print number of outliers for each feature
for column in df.columns:
     outliers = detect_outliers(df, column)
     print(f'Number of outliers in {column}: {len(outliers)}')
```

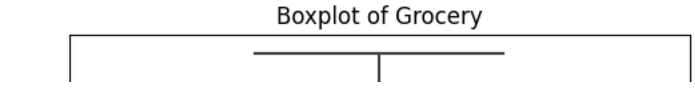


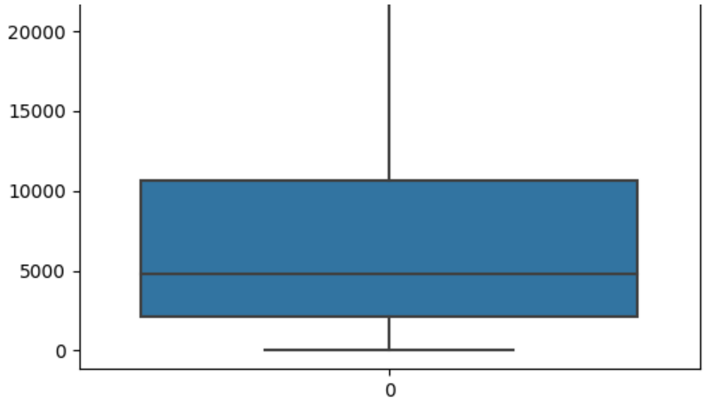
```
def handle_outliers(dataframe, column):
   Q1 = dataframe[column].quantile(0.25)
   Q3 = dataframe[column].quantile(0.75)
   IQR = Q3 - Q1
   lower_limit = Q1 - 1.5*IQR
   upper_limit = Q3 + 1.5*IQR
   dataframe[column] = dataframe[column].apply(lambda x: upper_limit if x > upper_limit else lower_limit if x < lower_limit else x)
# Handle outliers for each feature
for column in df.columns:
    handle_outliers(df, column)
```

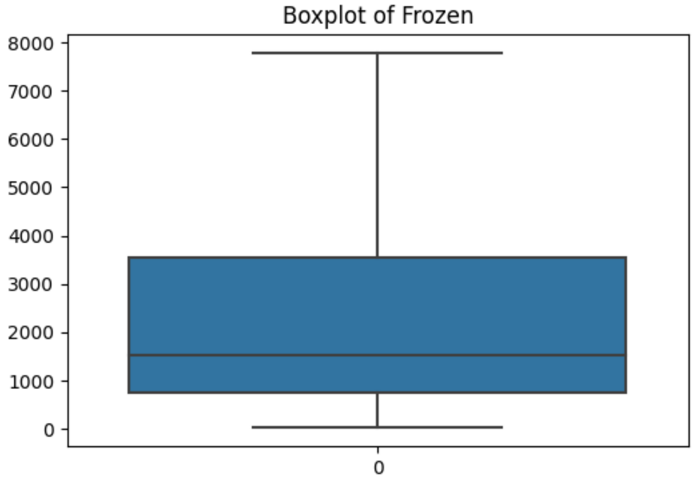
```
 # Import necessary libraries
import seaborn as sns
```

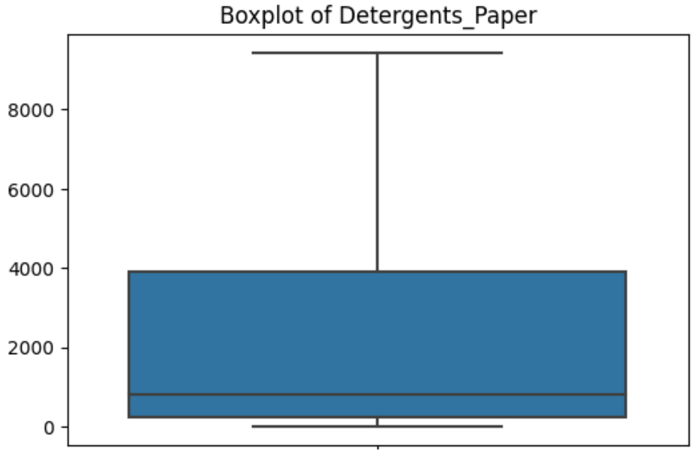
```
import matplotlib.pyplot as plt
# Draw boxplots for all features
for column in df.columns:
    plt.figure(figsize=(6, 4))
    sns.boxplot(df[column])
    plt.title(f'Boxplot of {column}')
    plt.show()
# Draw distribution plots for all features
for column in df.columns:
    plt.figure(figsize=(6, 4))
    sns.histplot(df[column], bins=30, kde=True)
    plt.title(f'Distribution of {column}')
    plt.show()
```


6000
4000
2000
0
0


Boxplot of Grocery


20000
15000
10000
5000
0
0


Boxplot of Frozen
8000
7000
6000
5000
4000
3000
2000
1000
0
0


Boxplot of Detergents_Paper
8000
6000
4000
2000
0