Step 1 : Import Libraries

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import scipy.stats as stats
import sales
```

Step 2: Create the Dataset

Step 3: Descriptive Statistics

In [12]:

```
import pandas as pd

# Load your dataset (change file name if needed)
sales_data = pd.read_csv(r"C:\Users\Lenovo\Desktop\datascience\28th - stats proj

# Descriptive statistics
descriptive_stats = sales_data['units_sold'].describe()

# Display descriptive statistics
print("\nDescriptive Statistics for Units Sold:")
print(descriptive_stats)

# Additional statistics
mean_sales = sales_data['units_sold'].mean()
median_sales = sales_data['units_sold'].median()
mode_sales = sales_data['units_sold'].mode()[0]
variance_sales = sales_data['units_sold'].var()
std_deviation_sales = sales_data['units_sold'].std()

# Group by category and calculate total and average sales
category_stats = sales_data.groupby('category')['units_sold'].agg(['sum', 'mean'
category_stats.columns = ['Category', 'Total Units Sold', 'Average Units Sold',

# Display the results
print("\nStatistical Analysis:")
print(f"Mean Units Sold: {mean_sales}")
print(f"Median Units Sold: {median_sales}")
print(f"Mode Units Sold: {mode_sales}")
print(f"Variance of Units Sold: {variance_sales}")
print(f"Standard Deviation of Units Sold: {std_deviation_sales}")
```

```
Descriptive Statistics for Units Sold:
count    20.000000
mean     18.800000
std       3.302312
min      13.000000
25%      17.000000
50%      18.500000
75%      21.000000
max      25.000000
Name: units_sold, dtype: float64

Statistical Analysis:
Mean Units Sold: 18.8
Median Units Sold: 18.5
Mode Units Sold: 17
Variance of Units Sold: 10.905263157894737
Standard Deviation of Units Sold: 3.3023117899275864
```

Step 4: Inferential Statistics

In [13]:

```
# Confidence Interval for the mean of units sold
confidence_level = 0.95
degrees_freedom = len(sales_data['units_sold']) - 1
sample_mean = mean_sales
sample_standard_error = std_deviation_sales / np.sqrt(len(sales_data['units_sold

# t-score for the confidence level
t_score = stats.t.ppf((1 + confidence_level) / 2, degrees_freedom)
margin_of_error = t_score * sample_standard_error

confidence_interval = (sample_mean - margin_of_error, sample_mean + margin_of_er
print("\nConfidence Interval for the Mean of Units Sold:")
print(confidence_interval)
print("\nDescriptive Statistics for Units Sold:")
print(descriptive_stats)
```

```
Confidence Interval for the Mean of Units Sold:
(np.float64(17.254470507823573), np.float64(20.34552949217643))

Descriptive Statistics for Units Sold:
count    20.000000
mean     18.800000
std       3.302312
min      13.000000
25%      17.000000
50%      18.500000
75%      21.000000
max      25.000000
Name: units_sold, dtype: float64
```

Hypothesis Testing

In [14]:

```
# Hypothesis Testing (t-test)
# Null hypothesis: Mean units sold is equal to 20
# Alternative hypothesis: Mean units sold is not equal to 20
```

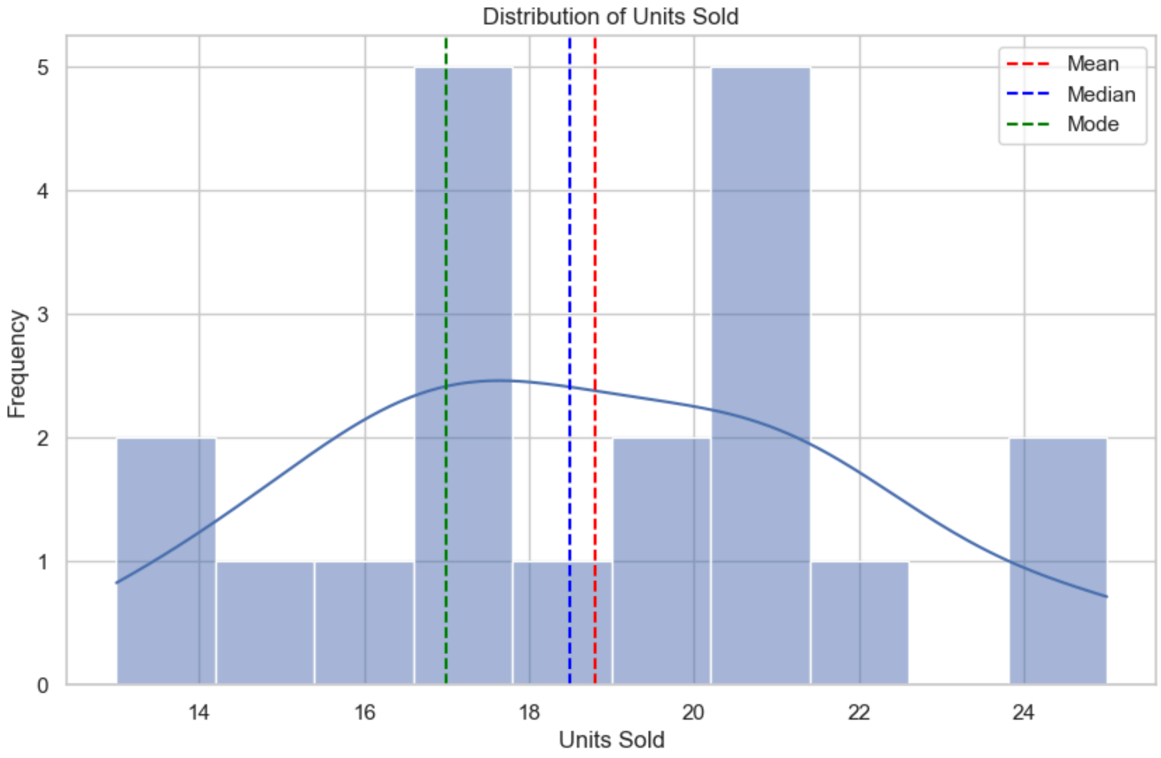
```
t_statistic, p_value = stats.ttest_1samp(sales_data['units_sold'], 20)

print("\nHypothesis Testing (t-test):")
print(f"T-statistic: {t_statistic}, P-value: {p_value}")

if p_value < 0.05:
    print("Reject the null hypothesis: The mean units sold is significantly diff
else:
    print("Fail to reject the null hypothesis: The mean units sold is not signif
```

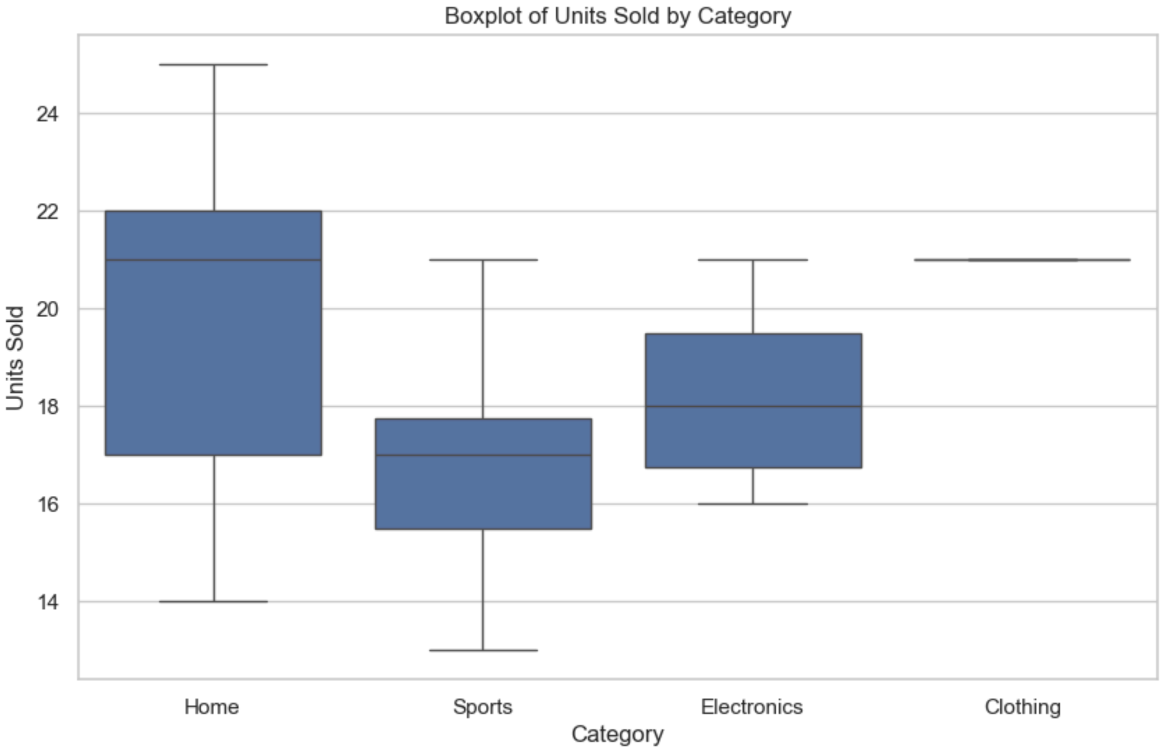
```
Hypothesis Testing (t-test):
T-statistic: -1.6250928099424466, P-value: 0.12061572226781002
Fail to reject the null hypothesis: The mean units sold is not significantly diff
erent from 20.
```

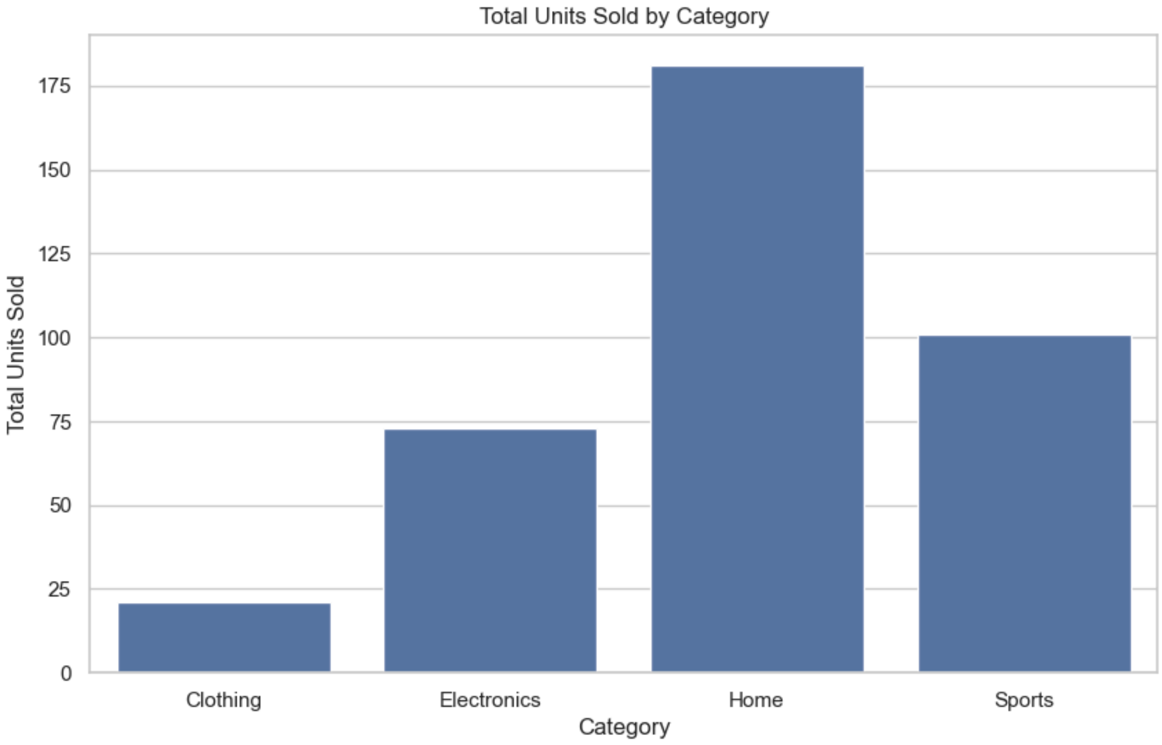
Step 5: Visualizations

In [15]:

```
# Visualizations
sns.set(style="whitegrid")

# Plot distribution of units sold
plt.figure(figsize=(10, 6))
sns.histplot(sales_data['units_sold'], bins=10, kde=True)
plt.title('Distribution of Units Sold')
plt.xlabel('Units Sold')
plt.ylabel('Frequency')
plt.axvline(mean_sales, color='red', linestyle='--', label='Mean')
plt.axvline(median_sales, color='blue', linestyle='--', label='Median')
plt.axvline(mode_sales, color='green', linestyle='--', label='Mode')
plt.legend()
plt.show()

# Boxplot for units sold by category
plt.figure(figsize=(10, 6))
sns.boxplot(x='category', y='units_sold', data=sales_data)
plt.title('Boxplot of Units Sold by Category')
plt.xlabel('Category')
plt.ylabel('Units Sold')
plt.show()

# Bar plot for total units sold by category
plt.figure(figsize=(10, 6))
sns.barplot(x='Category', y='Total Units Sold', data=category_stats)
plt.title('Total Units Sold by Category')
plt.xlabel('Category')
plt.ylabel('Total Units Sold')
plt.show()
```


Distribution of Units Sold
Mean
Median
Mode
Frequency
0
1
2
3
4
5
14
16
18
20
22
24
Units Sold


Boxplot of Units Sold by Category
Units Sold
14
16
18
20
22
24
Home
Sports
Electronics
Clothing
Category


Total Units Sold by Category
Total Units Sold
175
150
125
100
75
50
25
0
Clothing
Electronics
Home
Sports
Category