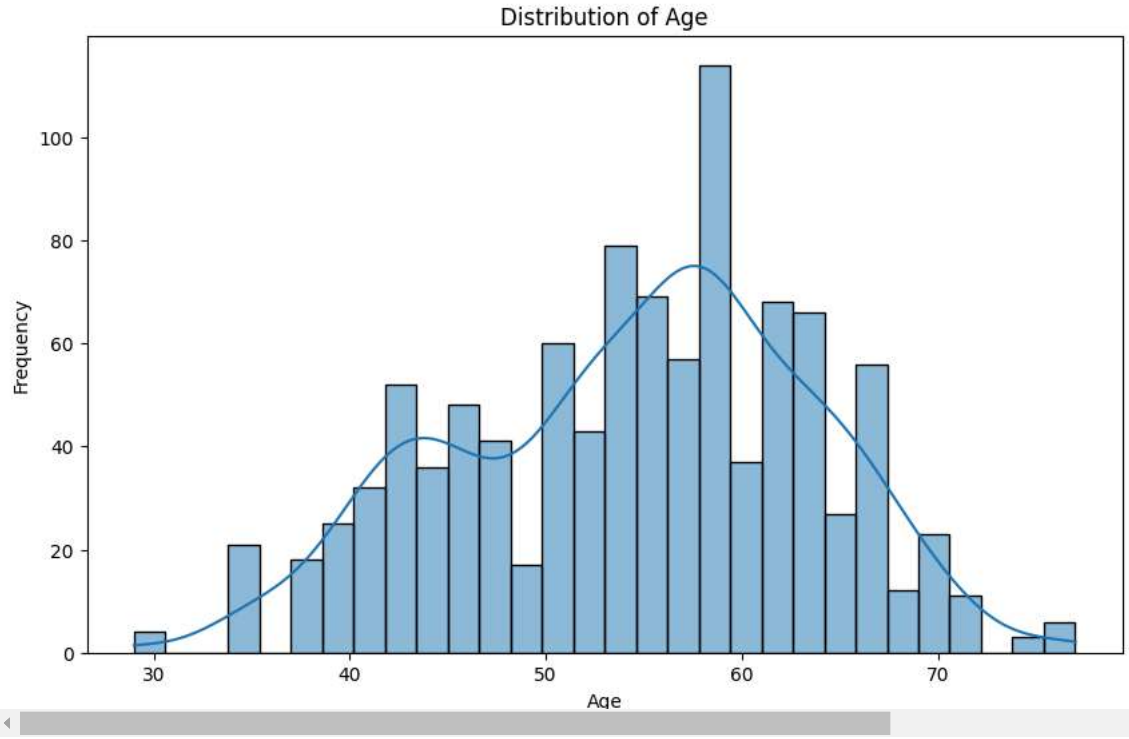
```
# Let's start by loading the data and inspecting the first few rows to understand its structure.

import pandas as pd

# Load the dataset
df = pd.read_csv('Heart_Disease_data.csv')

# Display the first few rows of the dataframe
print(df.head())

# Display the summary statistics of the dataframe
print(df.describe())

# Display the information about the dataframe
print(df.info())
```

```
   age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang  oldpeak  slope  \
0   52    1   0       125   212    0        1      168      0      1.0      2
1   53    1   0       140   203    1        0      155      1      3.1      0
2   70    1   0       145   174    0        1      125      1      2.6      0
3   61    1   0       148   203    0        1      161      0      0.0      2
4   62    0   0       138   294    1        1      106      0      1.9      1

   ca  thal  target
0   2     3       0
1   0     3       0
2   0     3       0
3   1     3       0
4   3     2       0
               age          sex           cp     trestbps        chol  \
count  1025.000000  1025.000000  1025.000000  1025.000000  1025.00000
mean     54.434146     0.695610     0.942439   131.611707   246.00000
std       9.072290     0.460373     1.029641    17.516718    51.59251
min      29.000000     0.000000     0.000000    94.000000   126.00000
25%      48.000000     0.000000     0.000000   120.000000   211.00000
50%      56.000000     1.000000     1.000000   130.000000   240.00000
75%      61.000000     1.000000     2.000000   140.000000   275.00000
max      77.000000     1.000000     3.000000   200.000000   564.00000

               fbs      restecg      thalach        exang      oldpeak  \
count  1025.000000  1025.000000  1025.000000  1025.000000  1025.000000
mean      0.149268     0.529756   149.114146     0.336585     1.071512
std       0.356527     0.527878    23.005724     0.472772     1.175053
min       0.000000     0.000000    71.000000     0.000000     0.000000
25%       0.000000     0.000000   132.000000     0.000000     0.000000
50%       0.000000     1.000000   152.000000     0.000000     0.800000
75%       0.000000     1.000000   166.000000     1.000000     1.800000
max       1.000000     2.000000   202.000000     1.000000     6.200000

             slope           ca         thal       target
count  1025.000000  1025.000000  1025.000000  1025.000000
mean      1.385366     0.754146     2.323902     0.513171
std       0.617755     1.030798     0.620660     0.500070
min       0.000000     0.000000     0.000000     0.000000
25%       1.000000     0.000000     2.000000     0.000000
50%       1.000000     0.000000     2.000000     1.000000
75%       2.000000     1.000000     3.000000     1.000000
max       2.000000     4.000000     3.000000     1.000000
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   age       1025 non-null   int64
 1   sex       1025 non-null   int64
 2   cp        1025 non-null   int64
 3   trestbps  1025 non-null   int64
 4   chol      1025 non-null   int64
 5   fbs       1025 non-null   int64
 6   restecg   1025 non-null   int64
```

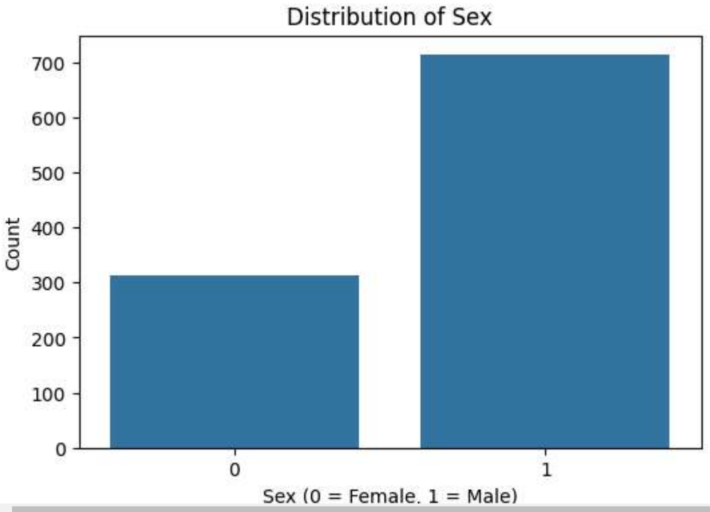
```
# Check for missing values
print(df.isnull().sum())

# Since there are no missing values, we can proceed to the next step
```

```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

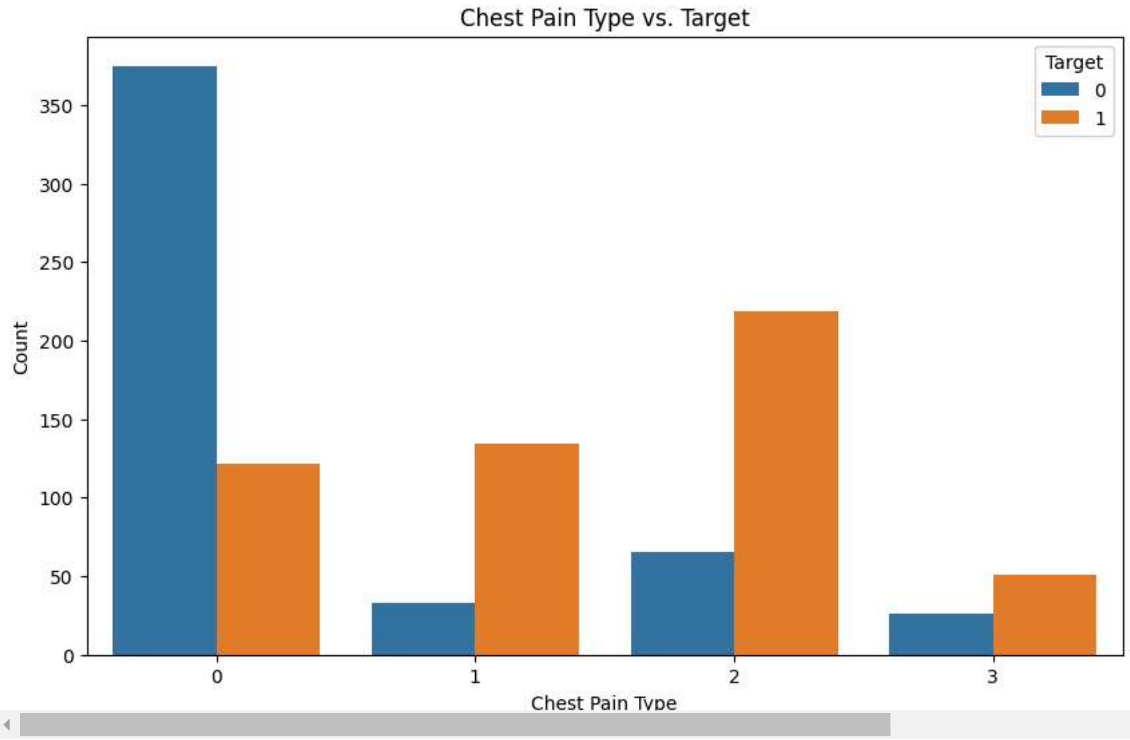
```
import matplotlib.pyplot as plt
import seaborn as sns

# Distribution of Age
plt.figure(figsize=(10, 6))
sns.histplot(df['age'], bins=30, kde=True)
plt.title('Distribution of Age')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.show()
```



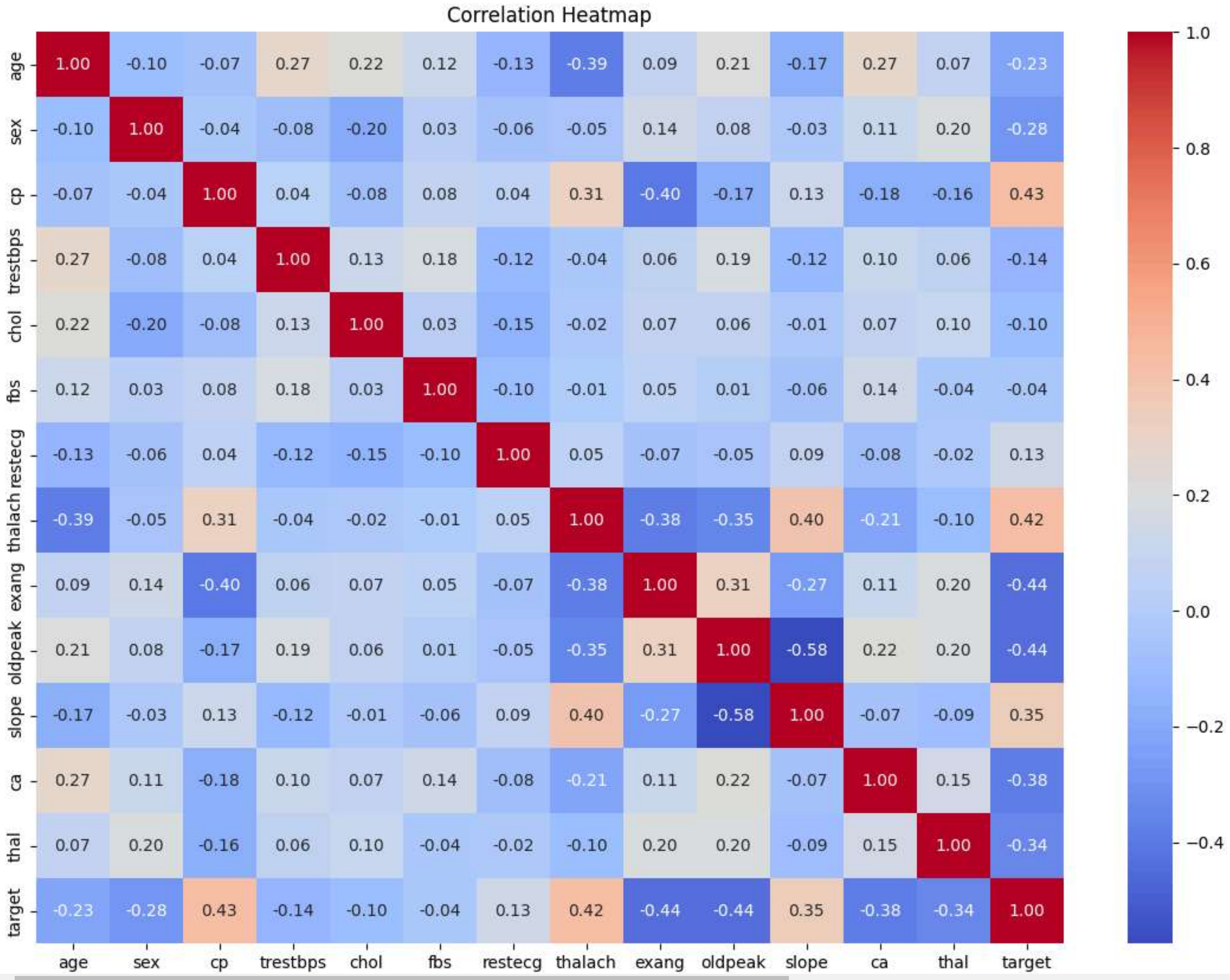
```
# Distribution of Sex
plt.figure(figsize=(6, 4))
sns.countplot(x='sex', data=df)
plt.title('Distribution of Sex')
plt.xlabel('Sex (0 = Female, 1 = Male)')
plt.ylabel('Count')
plt.show()
```



```
# Chest Pain Type vs. Target
plt.figure(figsize=(10, 6))
sns.countplot(x='cp', hue='target', data=df)
plt.title('Chest Pain Type vs. Target')
plt.xlabel('Chest Pain Type')
plt.ylabel('Count')
plt.legend(title='Target', loc='upper right')
plt.show()
```



```
# Correlation Heatmap
plt.figure(figsize=(14, 10))
sns.heatmap(df.corr(), annot=True, cmap='coolwarm', fmt='.2f')
plt.title('Correlation Heatmap')
plt.show()
```



```
from sklearn.preprocessing import StandardScaler

# Standardize the numerical features
scaler = StandardScaler()
numerical_features = ['age', 'trestbps', 'chol', 'thalach', 'oldpeak']
df[numerical_features] = scaler.fit_transform(df[numerical_features])

print("Numerical features standardized.")
```

```
Numerical features standardized.
```

```
from sklearn.model_selection import train_test_split

# Split the data into training and testing sets
X = df.drop('target', axis=1)
y = df['target']
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

print("Data split into training and testing sets.")
```

```
Data split into training and testing sets.
```

```
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, confusion_matrix, classification_report

# Train the model
model = LogisticRegression()
model.fit(X_train, y_train)

# Make predictions
y_pred = model.predict(X_test)

# Evaluate the model
accuracy = accuracy_score(y_test, y_pred)
conf_matrix = confusion_matrix(y_test, y_pred)
class_report = classification_report(y_test, y_pred)

print("Model trained and evaluated.")
print("Accuracy:", accuracy)
print("Confusion Matrix:\n", conf_matrix)
print("Classification Report:\n", class_report)
```

```
Model trained and evaluated.
Accuracy: 0.7951219512195122
Confusion Matrix:
 [[73 29]
 [13 90]]
Classification Report:
               precision    recall  f1-score   support

           0       0.85      0.72      0.78       102
           1       0.76      0.87      0.81       103

    accuracy                           0.80       205
   macro avg       0.80      0.79      0.79       205
weighted avg       0.80      0.80      0.79       205
```