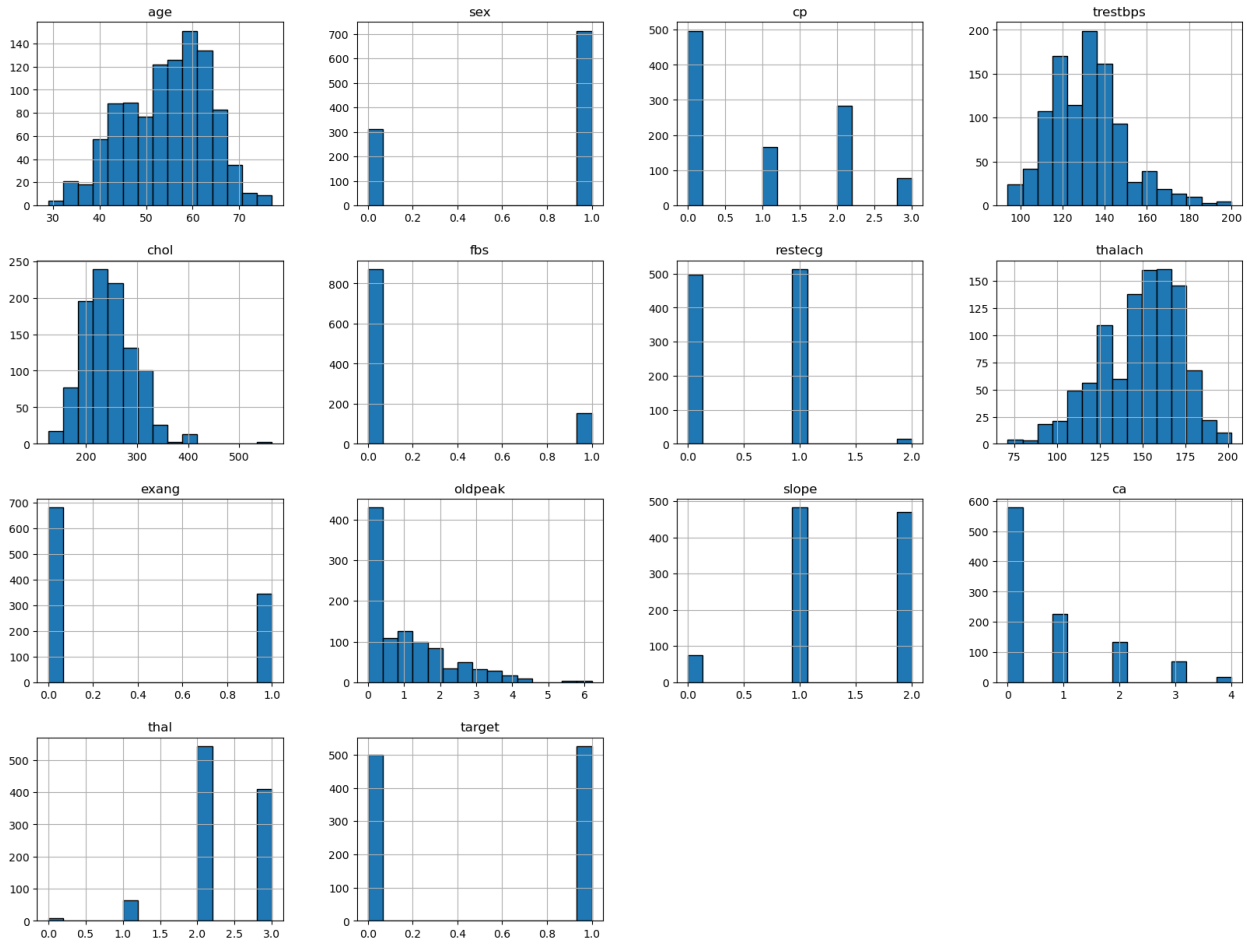
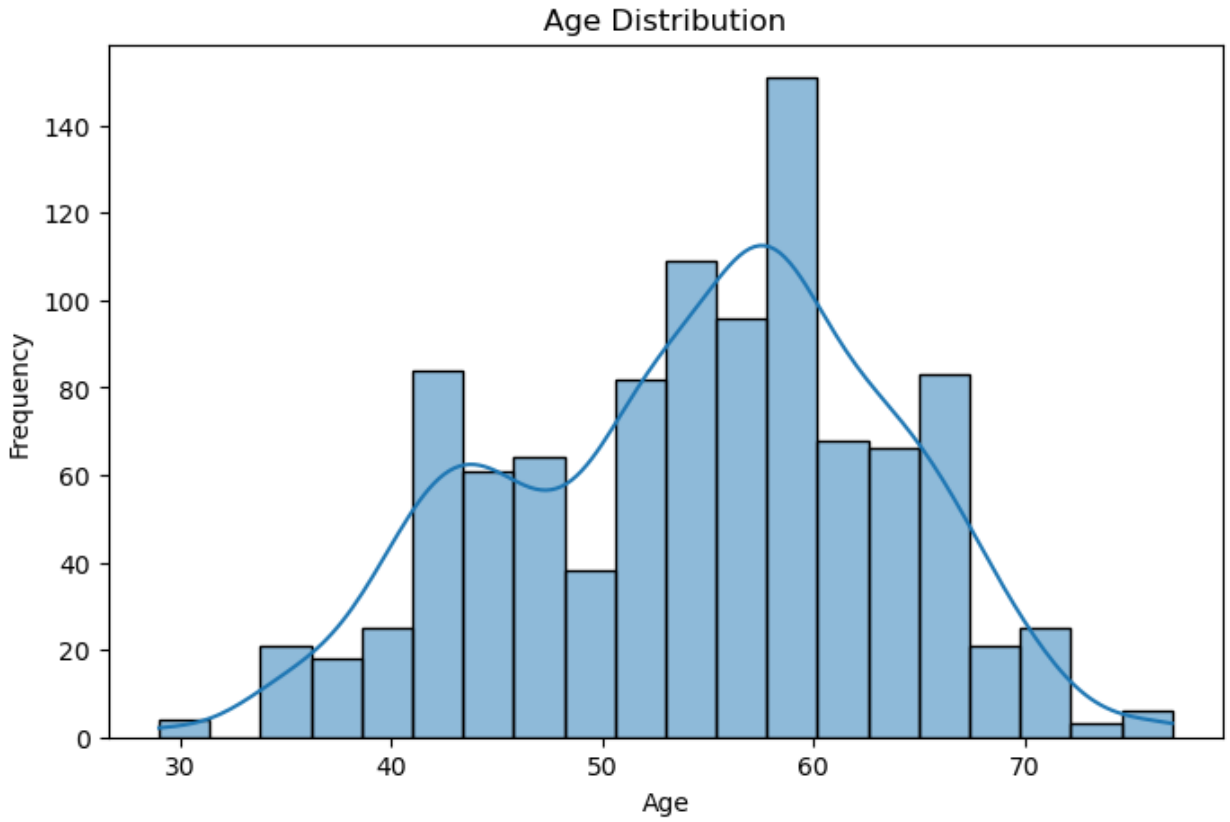
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

data = pd.read_csv('heart.csv')

data.head()
```

```
   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
```

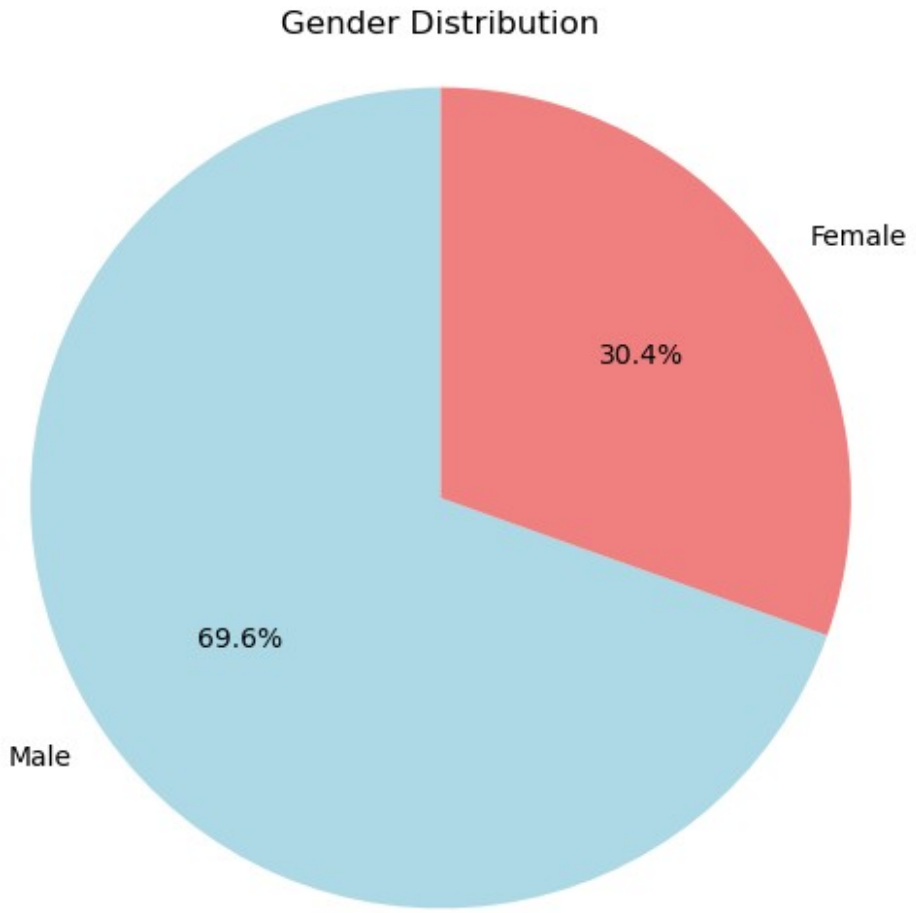
```
# a. Histograms (Objective: Analyze the distribution of numerical
features)
data.hist(bins=15, figsize=(20, 15), edgecolor='black')
plt.suptitle('Histograms of Numerical Features', fontsize=20)
plt.show()
```



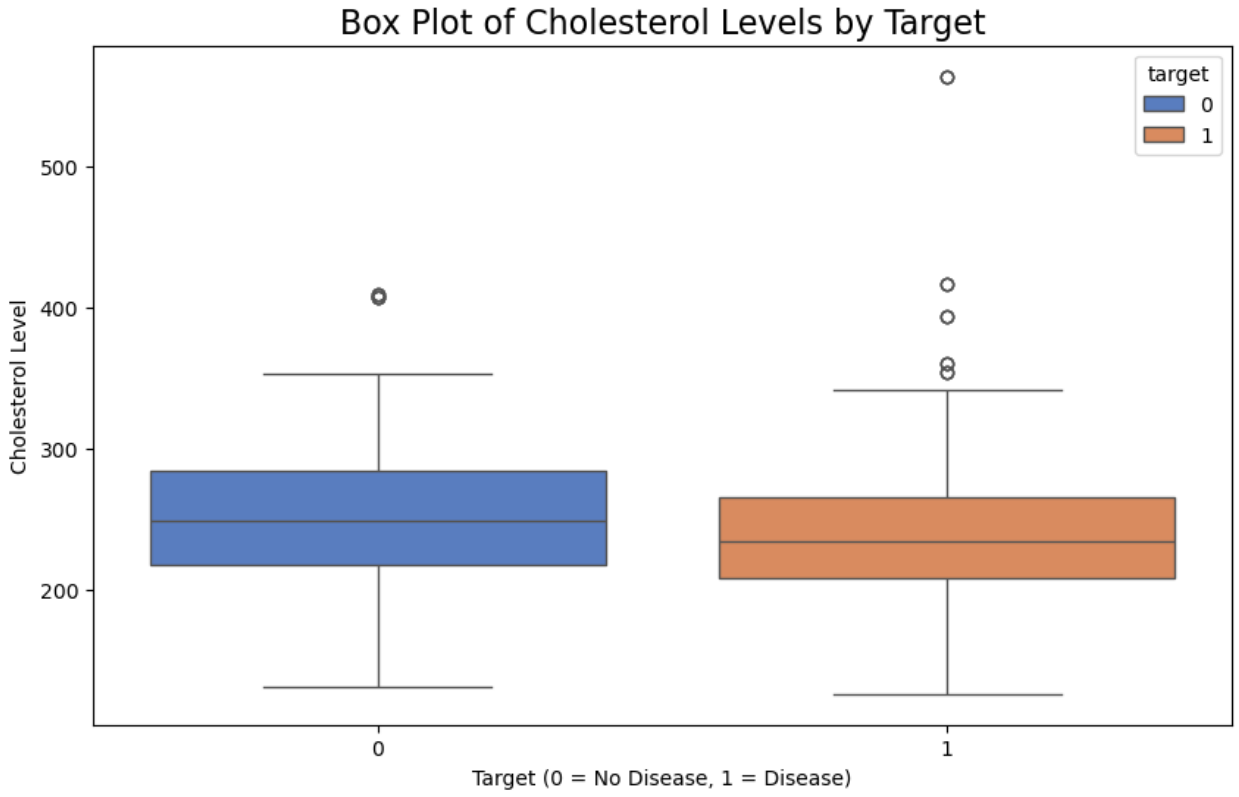

```
plt.figure(figsize=(8, 5))
sns.histplot(data=data, x='age', bins=20, kde=True)
plt.title('Age Distribution')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.show()
```



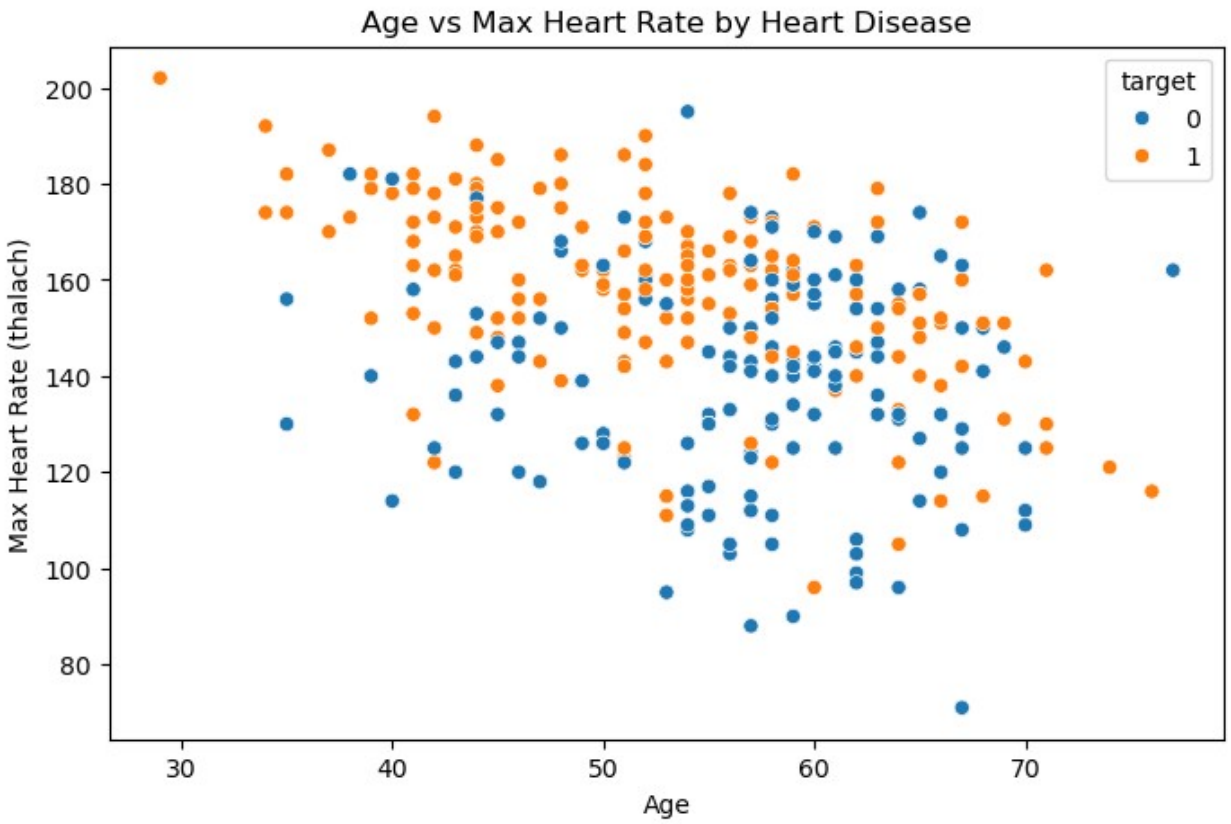

```
# f. Pie Charts (Objective: Visualize proportions, e.g., target
classes)
gender_counts = data['sex'].value_counts()
labels = ['Male', 'Female']
plt.figure(figsize=(6,6))
plt.pie(gender_counts, labels=labels, autopct='%1.1f%%',
startangle=90, colors=['lightblue', 'lightcoral'])
plt.title('Gender Distribution')
plt.axis('equal')
plt.show()
```



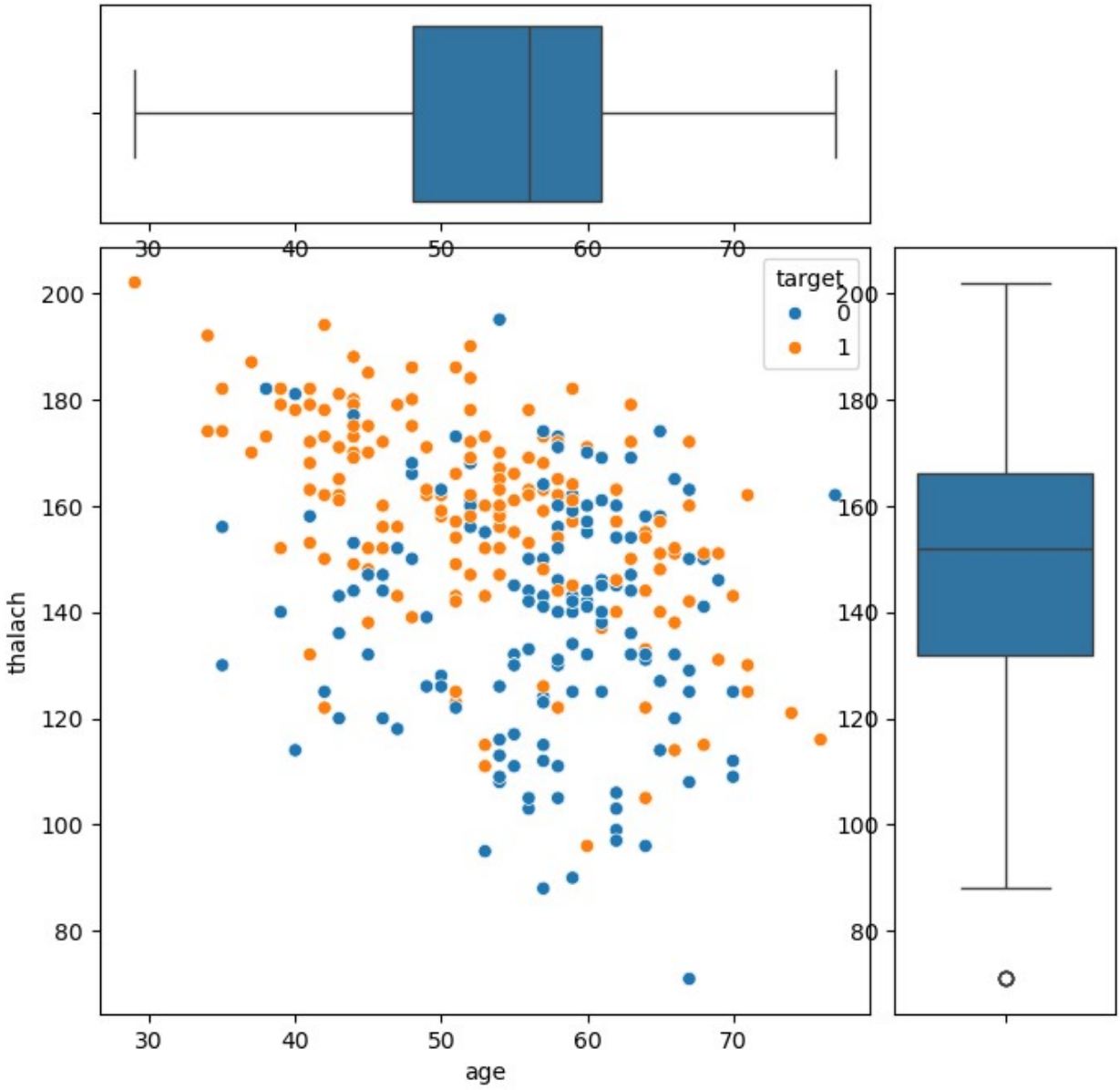

```
# g. Box Plots (Objective: Show spread and outliers of 'chol' by
'target')
plt.figure(figsize=(10, 6))
sns.boxplot(x='target', y='chol', data=data, hue='target',
palette='muted')
plt.title('Box Plot of Cholesterol Levels by Target', fontsize=16)
plt.xlabel('Target (0 = No Disease, 1 = Disease)')
plt.ylabel('Cholesterol Level')
plt.show()
```




```
# h. Scatter Plots (Objective: Examine relationships, e.g., 'age' vs. 'thalach')
plt.figure(figsize=(8, 5))
sns.scatterplot(data=data, x='age', y='thalach', hue='target')
plt.title('Age vs Max Heart Rate by Heart Disease')
plt.xlabel('Age')
plt.ylabel('Max Heart Rate (thalach)')
plt.show()
```




```
import matplotlib.gridspec as gridspec

fig = plt.figure(figsize=(8, 8))
gs = gridspec.GridSpec(2, 2, width_ratios=[7, 2], height_ratios=[2,
7],
                       wspace=0.05, hspace=0.05)

ax_scatter = plt.subplot(gs[1, 0])
ax_histx = plt.subplot(gs[0, 0], sharex=ax_scatter)
ax_histy = plt.subplot(gs[1, 1], sharey=ax_scatter)

sns.scatterplot(x='age', y='thalach', data=df, ax=ax_scatter,
hue='target')

sns.boxplot(x='age', data=df, ax=ax_histx, orient='h')
sns.boxplot(y='thalach', data=df, ax=ax_histy, orient='v')

ax_histx.set(xlabel='')
ax_histy.set(ylabel='')

plt.show()
```


target
0
1
thalach
age
30
40
50
60
70
80
100
120
140
160
180
200