# DATA ANALYSIS WITH PYTHON

# TASK-5

```
#importing all the libraries that we need
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline

#importing our dataset
df= pd.read_csv("C:\\Users\\vibha\\Downloads\\heart.csv")

#checking first five rows by calling df.head()
df.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
```

```
df.tail()
```

```
      age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang
oldpeak  \
1020   59    1   1       140   221    0        1      164      1
0.0
1021   60    1   0       125   258    0        0      141      1
2.8
1022   47    1   0       110   275    0        0      118      1
1.0
1023   50    0   0       110   254    0        0      159      0
0.0
1024   54    1   0       120   188    0        1      113      0
1.4

      slope  ca  thal  target
1020      2   0     2       1
1021      1   1     3       0
```

```
1022      1   1     2       0
1023      2   0     2       1
1024      1   1     3       0
```

```
#take a look at the column names.
df.columns.values
```

```
array(['age', 'sex', 'cp', 'trestbps', 'chol', 'fbs', 'restecg',
       'thalach', 'exang', 'oldpeak', 'slope', 'ca', 'thal',
'target'],
      dtype=object)
```

```
#checking for null values
df.isna().sum()
```

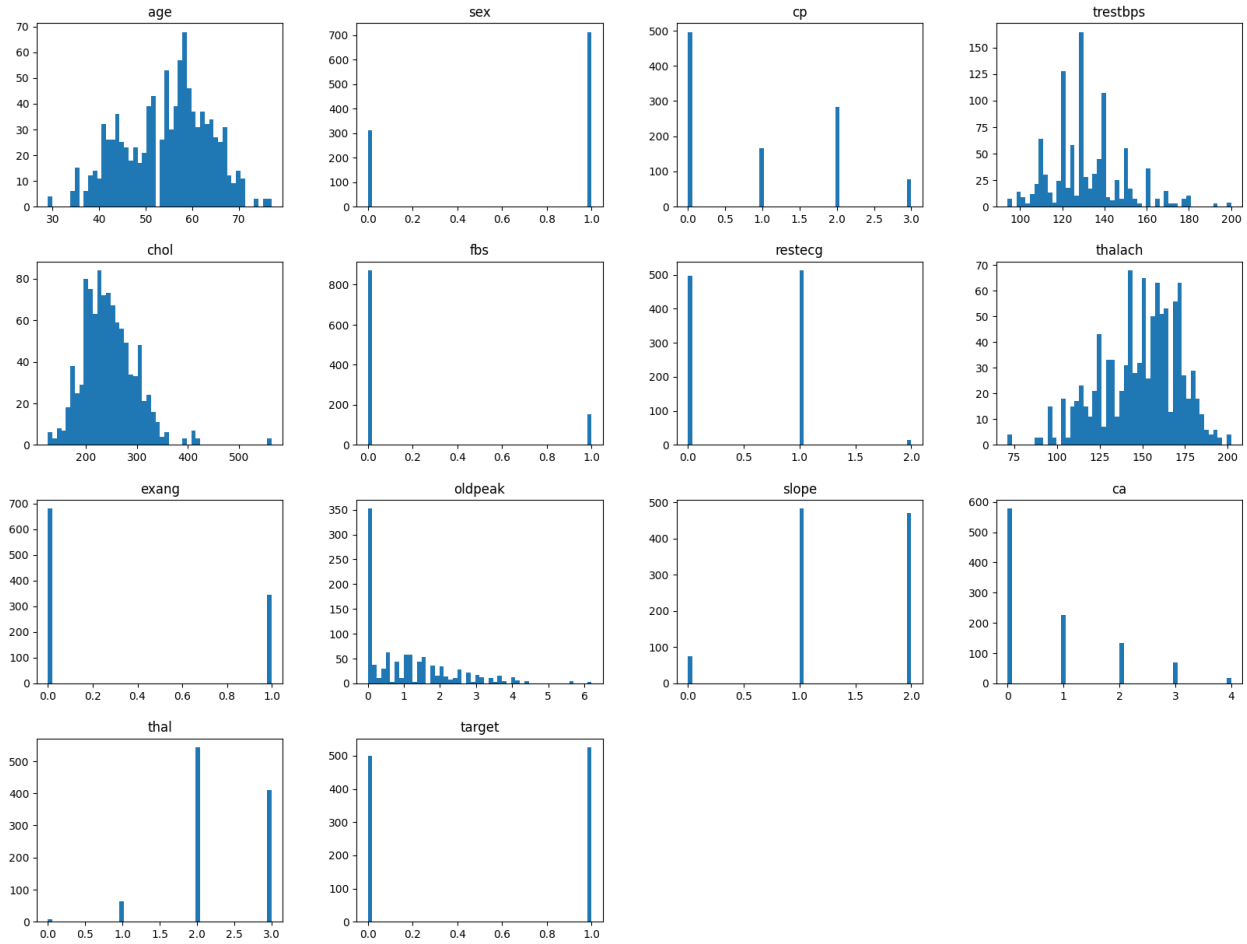
```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

```
#concise summary for our dataset
df.info()
```

```
<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
 7   thalach   1025 non-null   int64
 8   exang     1025 non-null   int64
 9   oldpeak   1025 non-null   float64
 10  slope     1025 non-null   int64
 11  ca        1025 non-null   int64
```

```
 12  thal      1025 non-null   int64
 13  target    1025 non-null   int64
dtypes: float64(1), int64(13)
memory usage: 112.2 KB
```

```
#plotting histogram of all numeric values
df.hist(bins=50,grid=False,figsize=(20,15));
```

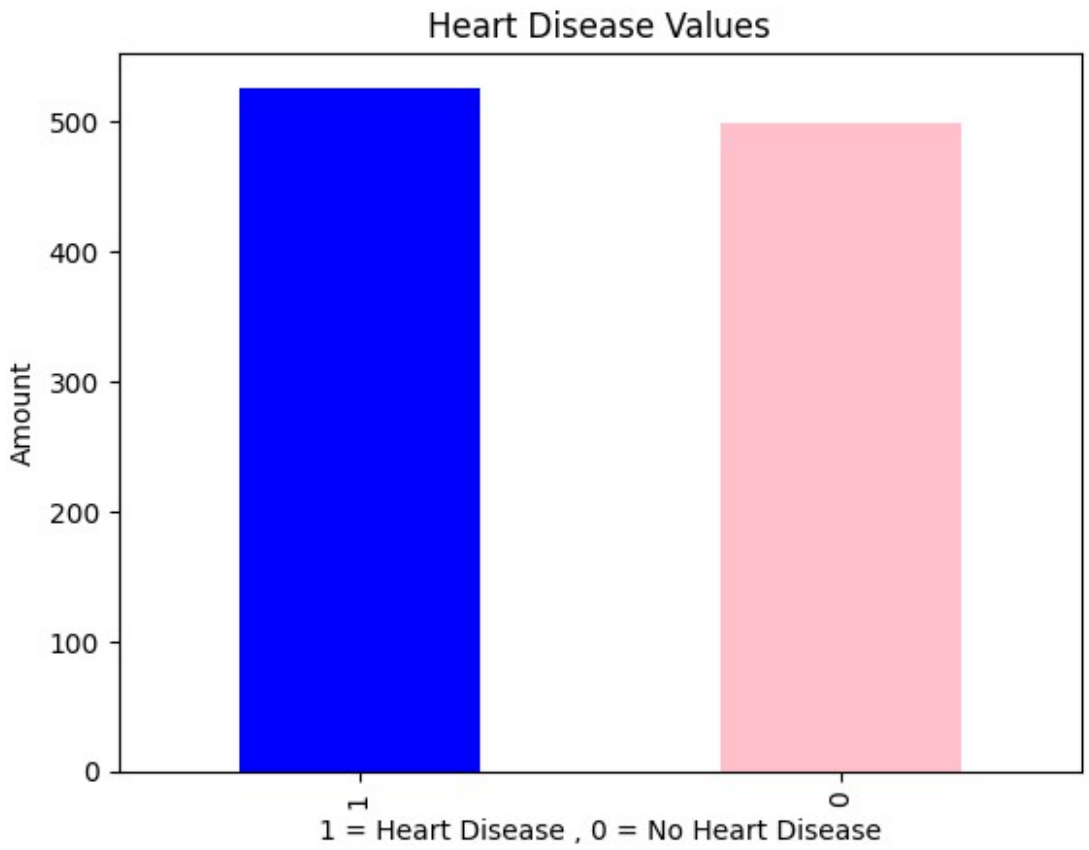



```
#generating descriptive statistics
df.describe()
```

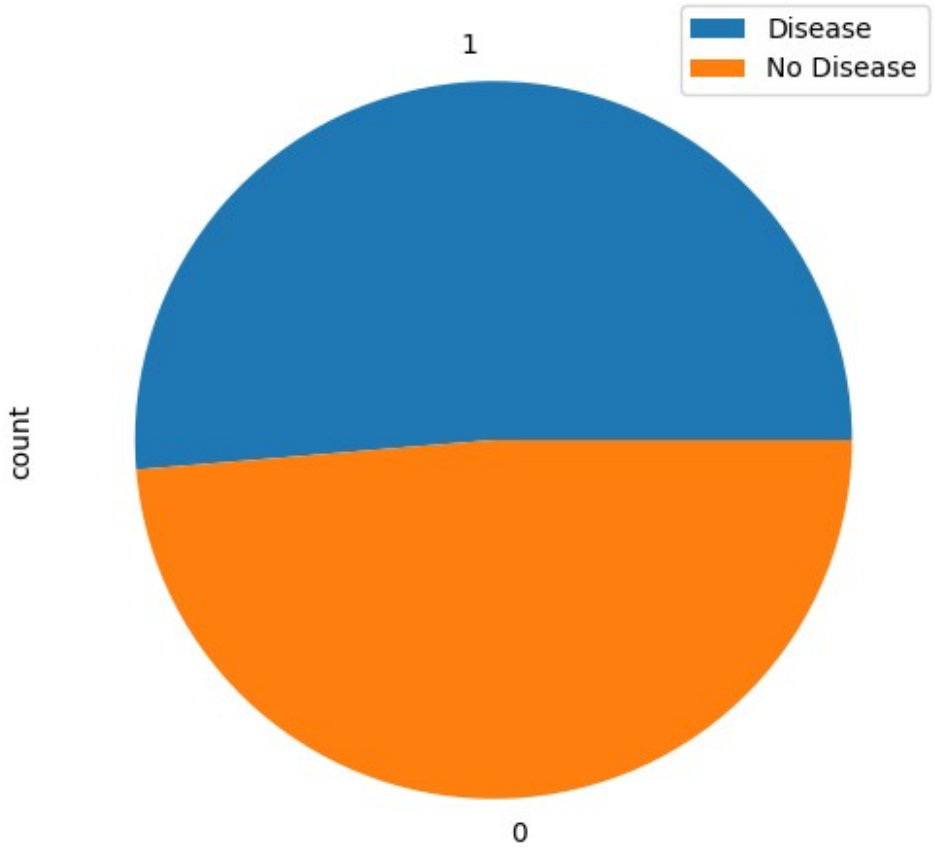
| | age | sex | cp | trestbps | chol |
|---|---|---|---|---|---|
| count | 1025.000000 | 1025.000000 | 1025.000000 | 1025.000000 | 1025.00000 |
| mean | 54.434146 | 0.695610 | 0.942439 | 131.611707 | 246.00000 |
| std | 9.072290 | 0.460373 | 1.029641 | 17.516718 | 51.59251 |
| min | 29.000000 | 0.000000 | 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

questions = ["1.How many people have heart disease and how many people
doesn't have heart disease?",
             "2.People of which sex has most heart disease?",
             "3.People of which sex has which type of chest pain
most?",
             "4.People with which chest pain are most pron to have
heart disease?",
             "5.people of which age has most number of heart
disease?",
             "6.How many people have the chol at what age most?",
             "7.How many people of age below 40 have heart disease?"]
questions
```

```
["1.How many people have heart disease and how many people doesn't
have heart disease?",
 '2.People of which sex has most heart disease?',
 '3.People of which sex has which type of chest pain most?',
 '4.People with which chest pain are most pron to have heart
disease?',
 '5.people of which age has most number of heart disease?',
 '6.How many people have the chol at what age most?',
 '7.How many people of age below 40 have heart disease?']

#Let's find the answer of first question.

#1.How many people have heart disease and how many people doesn't have
heart disease?"

#getting the values
df.target.value_counts()

target
1    526
0    499
Name: count, dtype: int64

#plotting bar chart
df.target.value_counts().plot(kind= 'bar',color =["Blue","Pink"])
plt.title("Heart Disease Values")
plt.xlabel("1 = Heart Disease , 0 = No Heart Disease")
plt.ylabel("Amount");
```



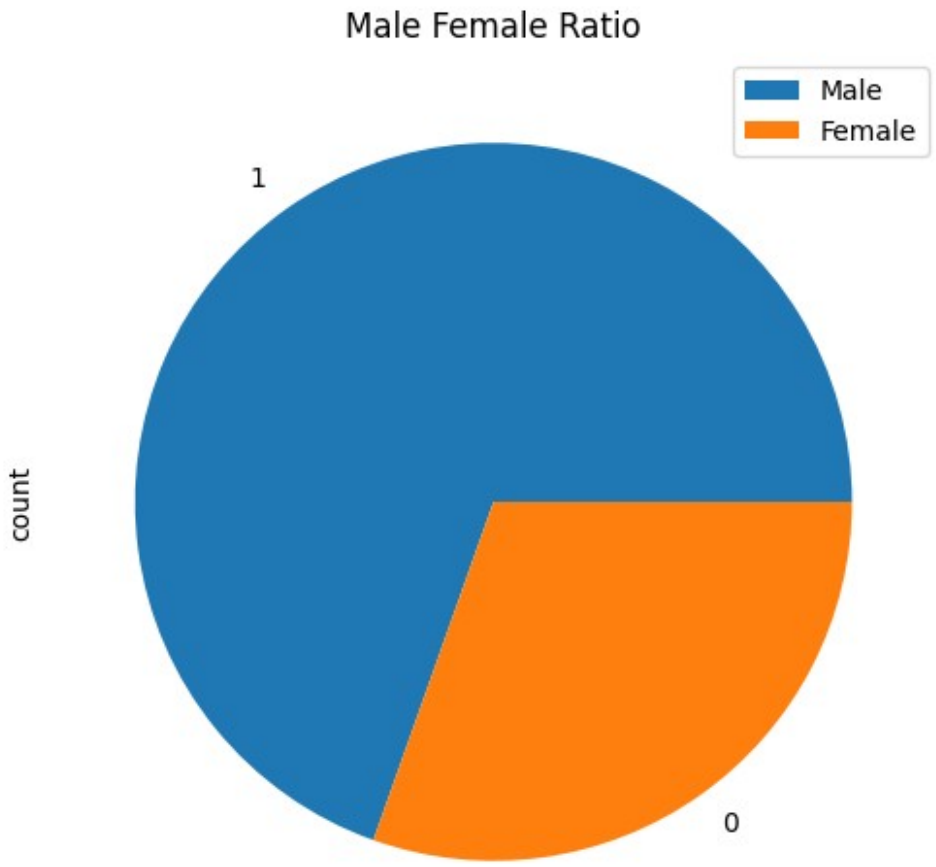

```
#plotting a pie chart
df.target.value_counts().plot(kind ='pie', figsize = (8,6))
plt.legend(["Disease","No Disease"]);
```




```
# '0' represent 'Female'

# '1' represent 'Male'

# '0' represent 'No disease'

# '1' represent 'Disease'

#Now Let's check how many 'Male' and 'Female' are in the dataset

df.sex.value_counts()
```

```
sex
1    713
0    312
Name: count, dtype: int64
```

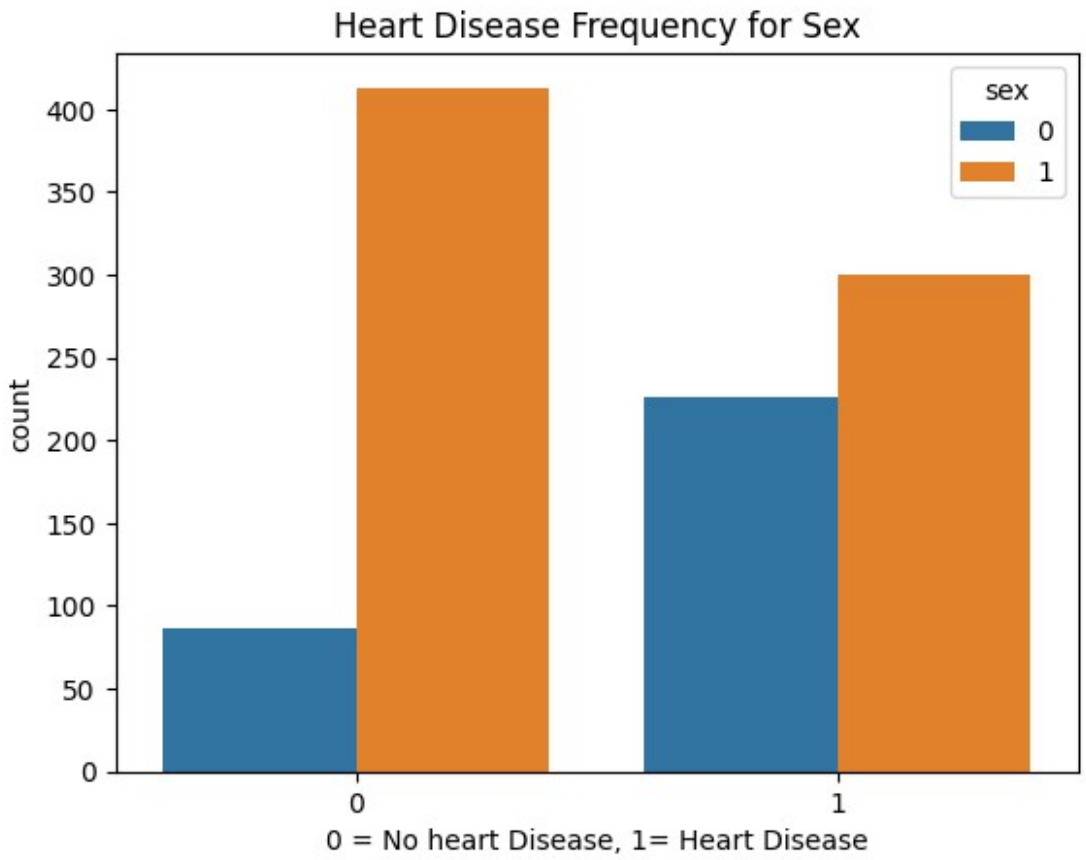
```
#plotting a pie chart
df.sex.value_counts().plot(kind = 'pie', figsize = (8,6))
plt.title('Male Female Ratio')
plt.legend(['Male', 'Female']);
```




```
#Let's find the answer of our 2nd question.

#2.People of which sex has most heart disease?'

pd.crosstab(df.target,df.sex)
```

| sex | 0 | 1 |
|---|---|---|
| target | | |
| 0 | 86 | 413 |
| 1 | 226 | 300 |

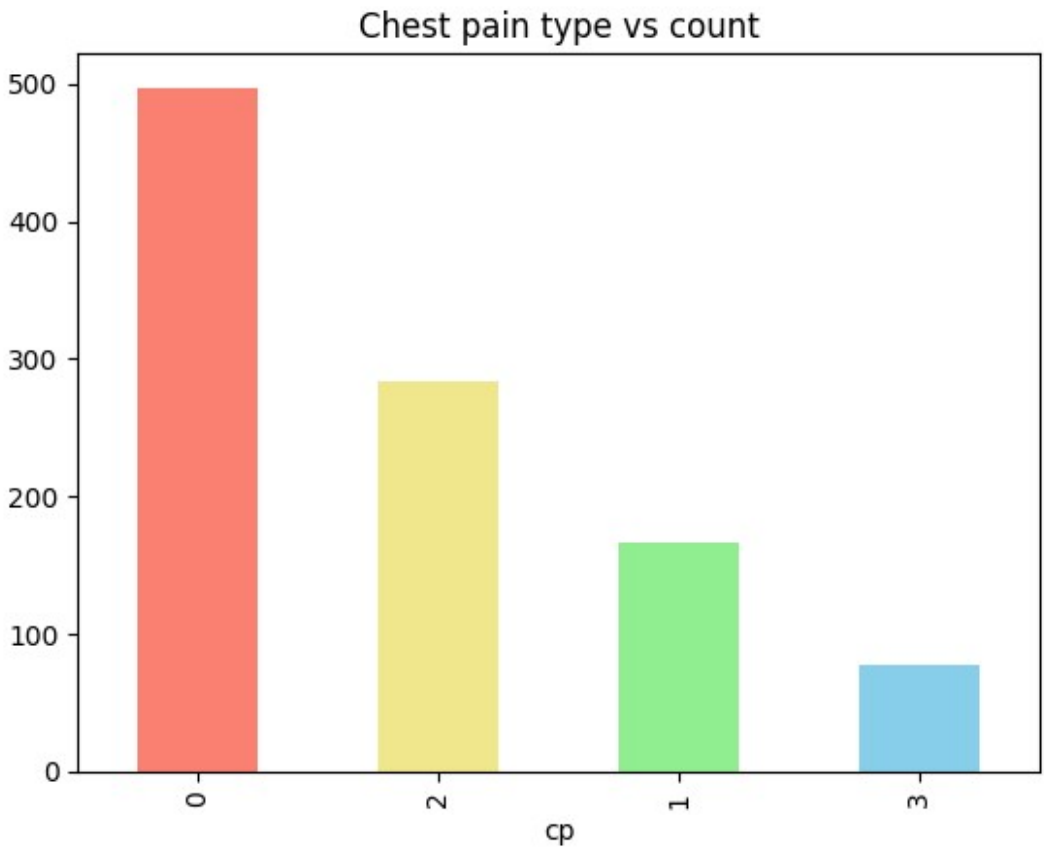
```
sns.countplot(x = 'target', data = df,hue = 'sex')
plt.title("Heart Disease Frequency for Sex")
plt.xlabel("0 = No heart Disease, 1= Heart Disease");
```




```
#Number of male is more thsn double in our dataset than female.
#More than '45% male' has heart disease and '75% female' has heart
disease.

#let's move to question

#3.'People of which sex has which type of chest pain most?'

#counting values for different chest pain
df.cp.value_counts()
```

```
cp
0    497
2    284
1    167
3     77
Name: count, dtype: int64
```

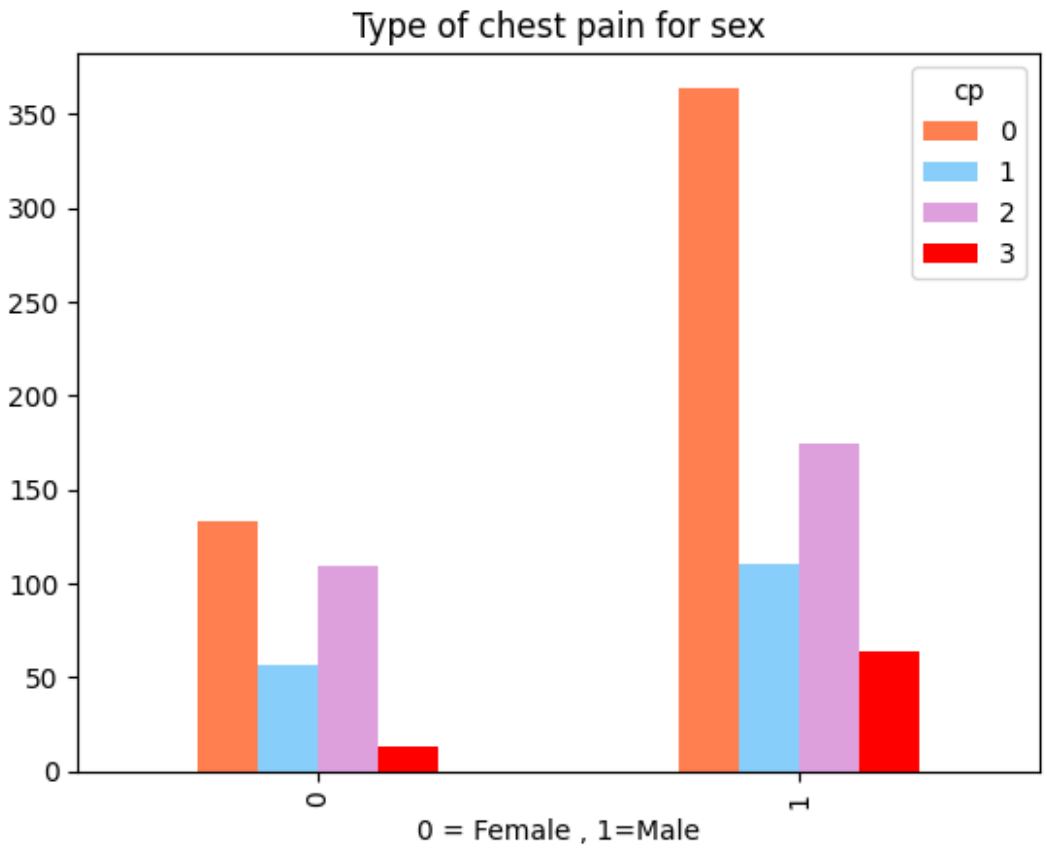
```
#plotting a bar chart
df.cp.value_counts().plot(kind = 'bar', color=
['salmon','khaki','lightgreen','skyblue'])
plt.title('Chest pain type vs count');
```




```
pd.crosstab(df.sex , df.cp)
```

| cp | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| sex | | | | |
| 0 | 133 | 57 | 109 | 13 |
| 1 | 364 | 110 | 175 | 64 |

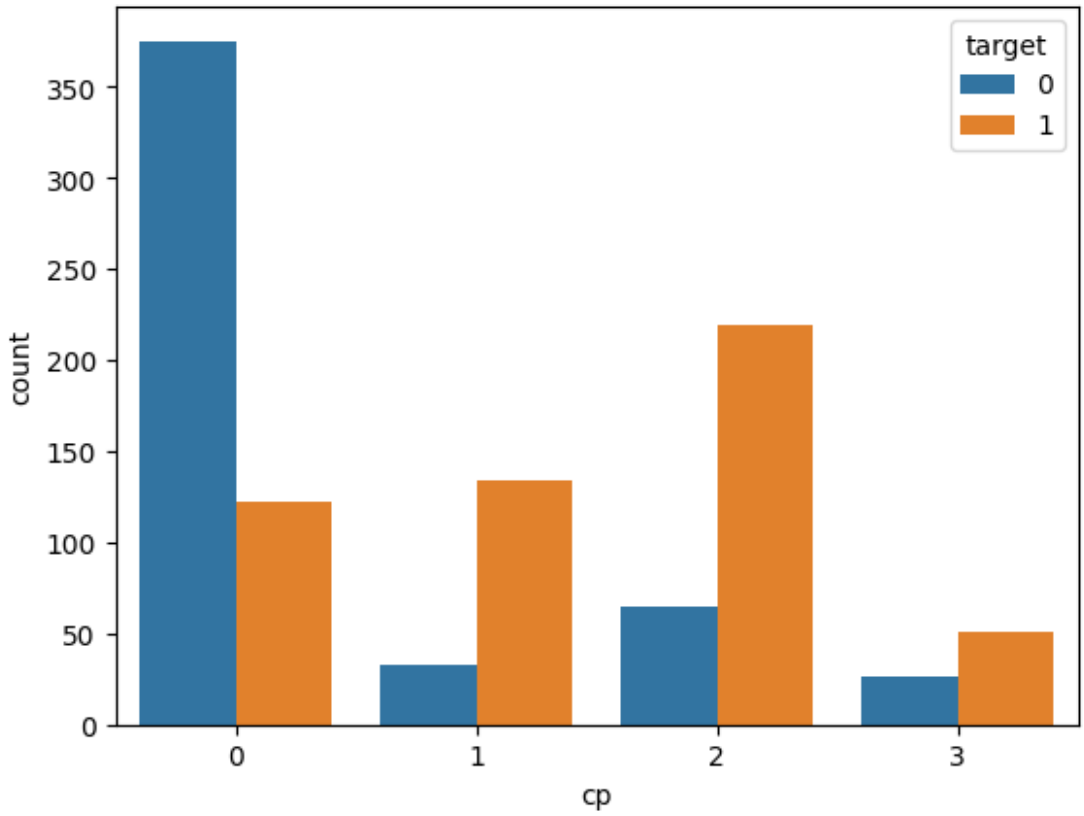
```
pd.crosstab(df.sex,df.cp).plot(kind= 'bar',
color=['coral','lightskyblue','plum','red'])
plt.title('Type of chest pain for sex')
plt.xlabel('0 = Female , 1=Male');
```



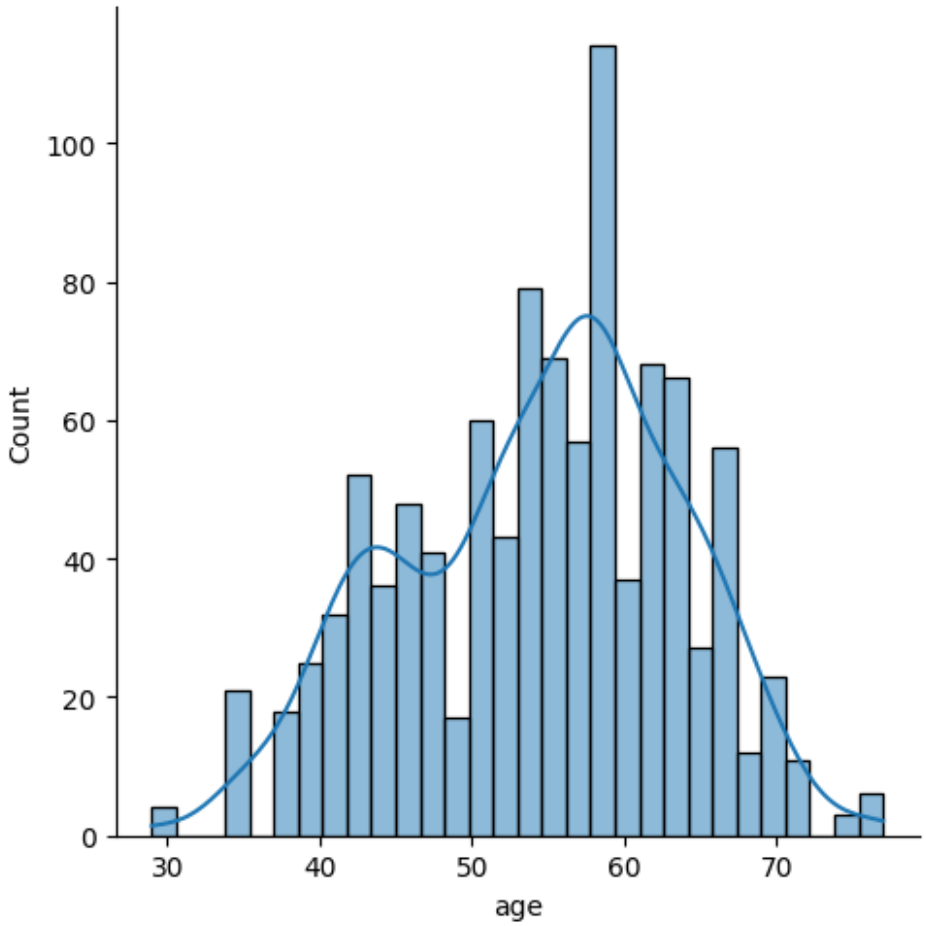

```
#Most of 'male' has 'type 0' chest pain and least of 'male' has 'type
4' pain.

#in case of 'Female'  'type 0' and 'type 1' percentage is almost same.

#Now question 4

#4.'People with which chest pain are most pron to have heart disease?'

pd.crosstab(df.cp,df.target)
```

| target | 0 | 1 |
|---|---|---|
| cp | | |
| 0 | 375 | 122 |
| 1 | 33 | 134 |
| 2 | 65 | 219 |
| 3 | 26 | 51 |

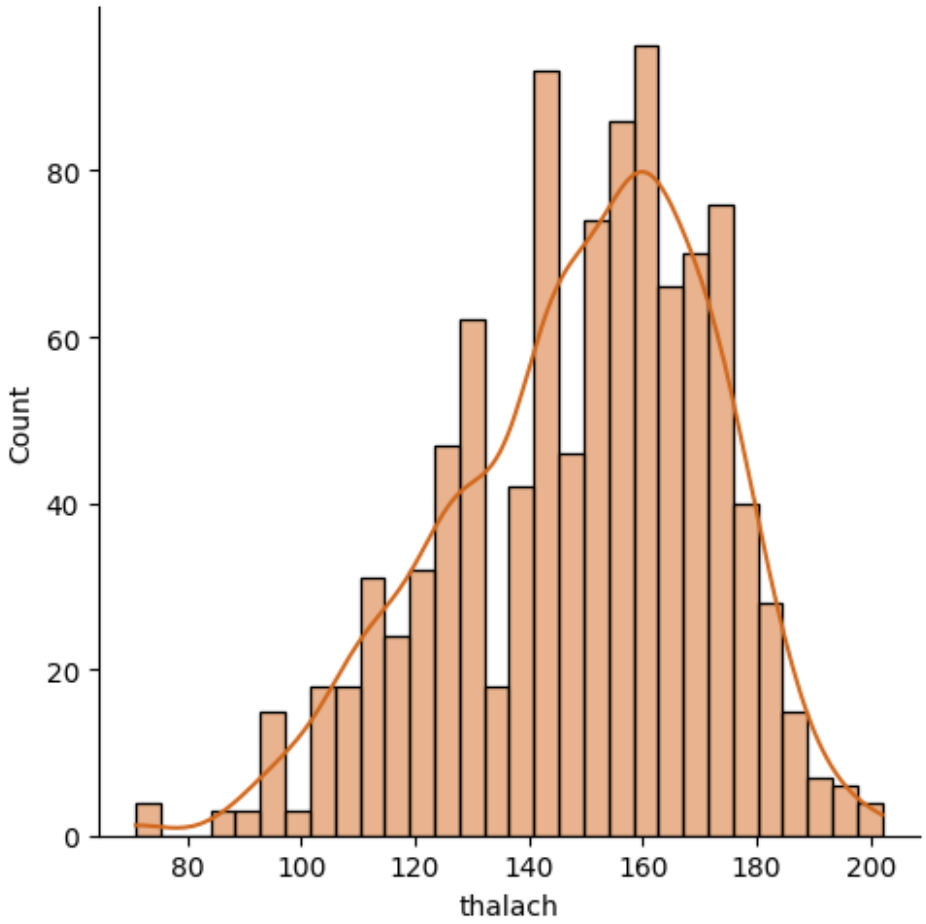
```
sns.countplot(x ='cp' ,data = df, hue ='target');
```




```
#most of people who has 'type 0' chest pain has less chance of heart
disease.

#And we see the opposite for other types.

#Now let's take a look at our age column.

#create a distribution plot with normal distribution curve
sns.displot( x='age',data = df,bins = 30,kde = True);
```




```
#'58=59' year old people are most in the dataset

#let's plot another distribution plot for 'maximum heart rate'
sns.displot(x = 'thalach', data = df, bins = 30, kde = True,color
='chocolate');
```

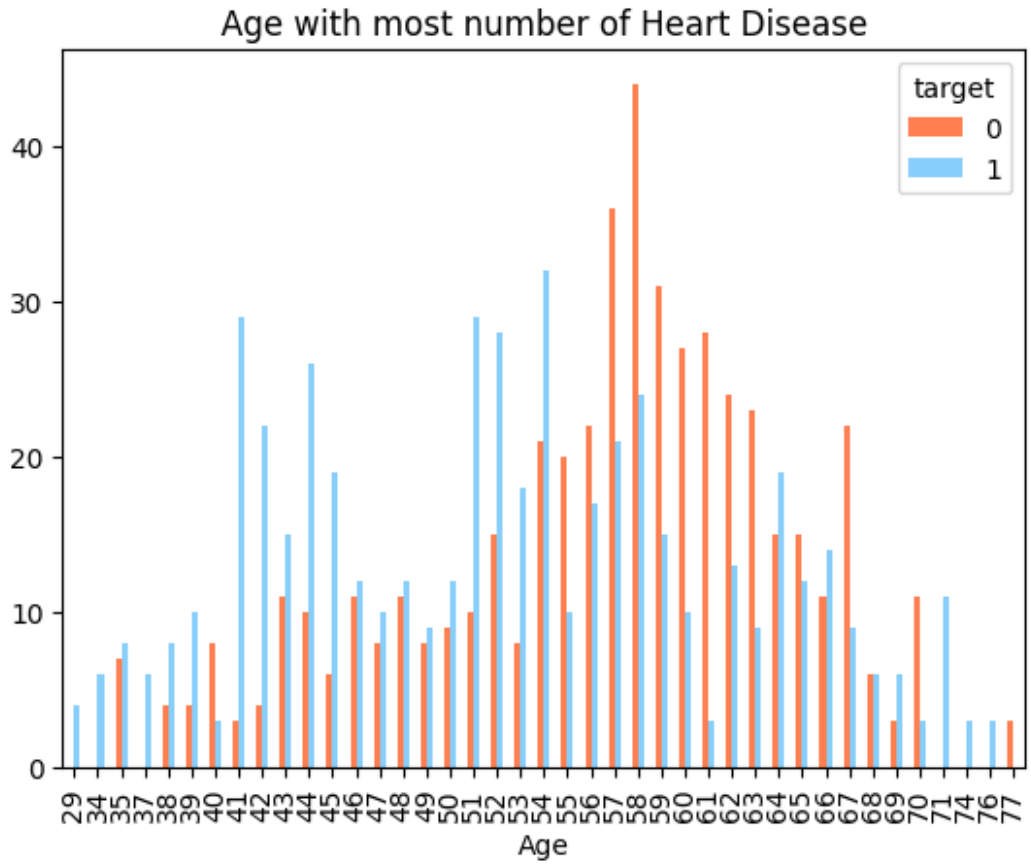



```
#From this plot we get a clear overview about maximum heart rate
represented byt 'thalach'

#Now question 5

#5.people of which age has most number of heart disease?
pd.crosstab(df.age , df.target)
df.head(5)
```

```
   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
```

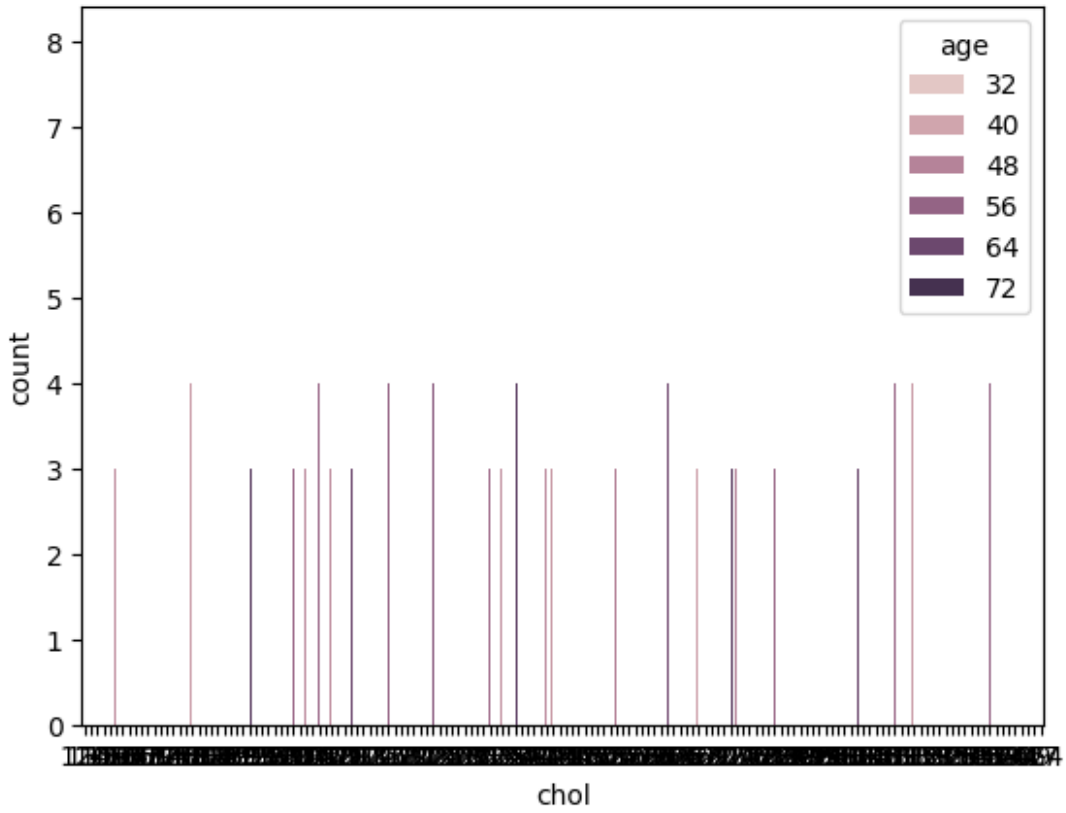
```
pd.crosstab(df.age,df.target).plot(kind= 'bar',
color=['coral','lightskyblue','plum','red','green'])
plt.title('Age with most number of Heart Disease')
plt.xlabel('Age');
```




```
#From this plot we get a clear overview about maximum heart disease
occurs on 'age<40'

#Now question 6

#6.How many people have the chol at what age most?'
pd.crosstab(df.chol , df.target)
df.head(5)
```

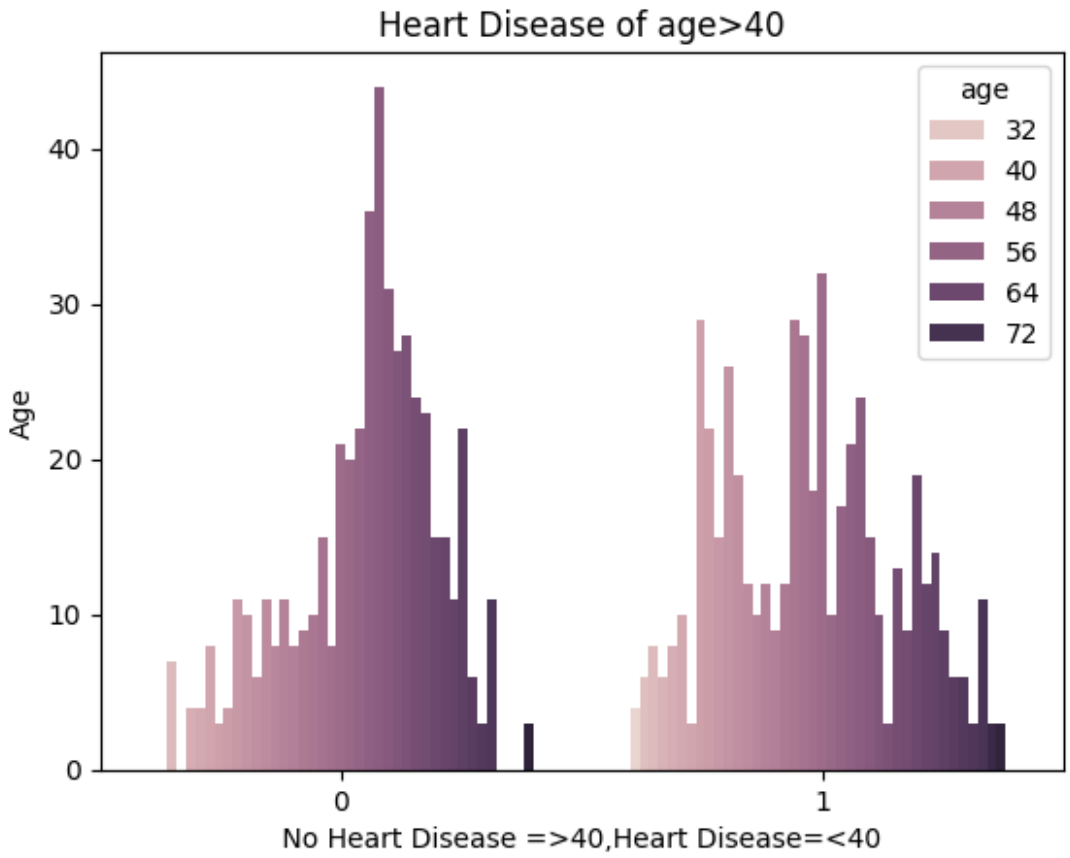
```
   age  sex  cp  trestbps  chol  fbs  restecg  thalach  exang  oldpeak
slope  \
0   52    1   0       125   212    0        1      168      0      1.0
2
1   53    1   0       140   203    1        0      155      1      3.1
0
2   70    1   0       145   174    0        1      125      1      2.6
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
```

```
sns.countplot(x ='chol' ,data = df, hue ='age');
```




```
#From this plot we get a clear overview about at what age most people
have 'chol' it's the age '32 to 40'.
```

```
#Now question 7

#7.How many people of age below 40 have heart disease?
sns.countplot(x = 'target', data = df,hue = 'age')
plt.title("Heart Disease of age>40")
plt.xlabel(" No Heart Disease =>40,Heart Disease=<40 ")
plt.ylabel("Age");
```




```
#From this plot we get a clear overview about at age 40 or less than
4o mostly 'Male' are having high rate of heart disease.
```