Load all the required libraries

In [1]:

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import confusion_matrix
from sklearn import metrics
```

Load data set

In [2]:

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

In [3]:

```
data.head()
```

Out[3]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1
1	37	1	2	130	250	0	1	187	0	3.5	0	0	2	1
2	41	0	1	130	204	0	0	172	0	1.4	2	0	2	1
3	56	1	1	120	236	0	1	178	0	0.8	2	0	2	1
4	57	0	0	120	354	0	1	163	1	0.6	2	0	2	1

Exploring the data set

In [4]:

```
data.target.value_counts()
```

Out[4]:

```
1    165
0    138
Name: target, dtype: int64
```

Labelling the data set

In [5]:

```
X = data.iloc[:,:-1].values
y = data.iloc[:,13].values
```

Splitting data

In [6]:

```
X_train, X_test, y_train, y_test =  train_test_split(X,y,test_size = 0.25, random_state= 0)
```

Normalize the data

In [7]:

```
sc_X = StandardScaler()
X_train = sc_X.fit_transform(X_train)
X_test = sc_X.transform(X_test)
```

Accuracy based on K values

In [8]:

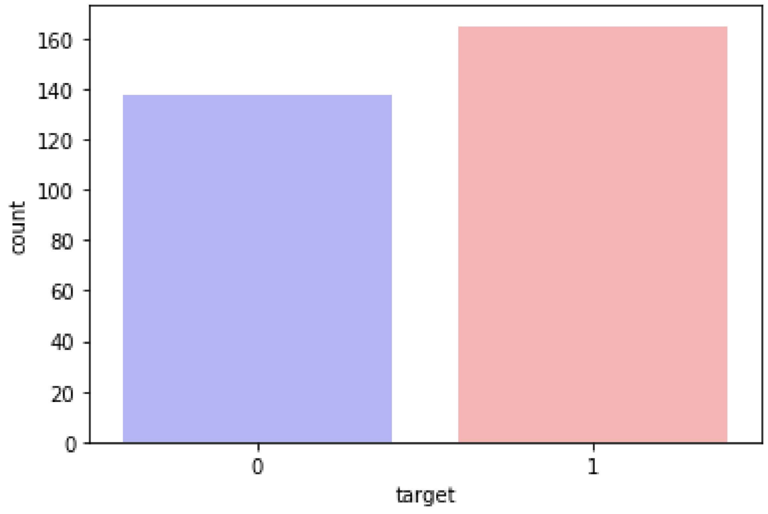
```
classifier = KNeighborsClassifier(n_neighbors = 9, metric = 'minkowski', p = 2)
classifier = classifier.fit(X_train,y_train)
#prediction
y_pred = classifier.predict(X_test)
#check accuracy
accuracy = metrics.accuracy_score(y_test, y_pred)
print('Accuracy: {:.2f}'.format(accuracy))
```

```
Accuracy: 0.86
```

Visualising the data set

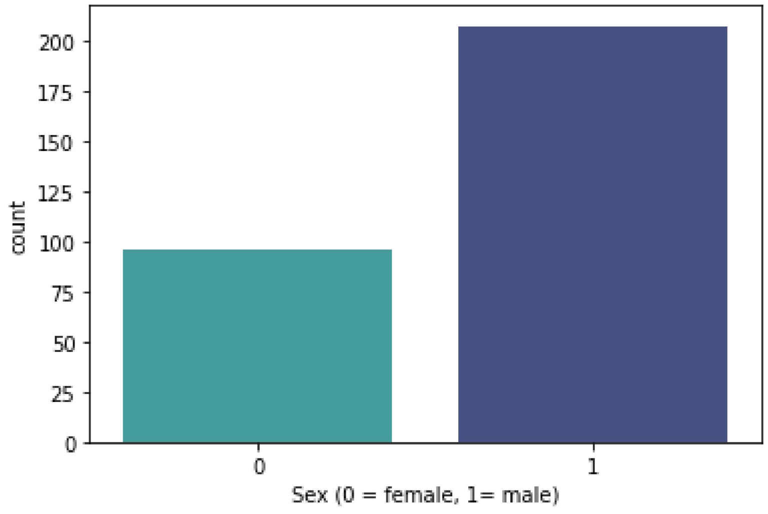
In [9]:

```
sns.countplot(x="target", data=data, palette="bwr")
plt.show()
```



In [10]:

```
sns.countplot(x='sex', data=data, palette="mako_r")
plt.xlabel("Sex (0 = female, 1= male)")
plt.show()
```



In [17]:

```
countFemale = len(data[data.sex == 0])
countMale = len(data[data.sex == 1])
print("Percentage of Female Patients: {:.2f}%".format((countFemale / (len(data.sex))*100)))
print("Percentage of Male Patients: {:.2f}%".format((countMale / (len(data.sex))*100)))
```

```
Percentage of Female Patients: 31.68%
Percentage of Male Patients: 68.32%
```

In [18]:

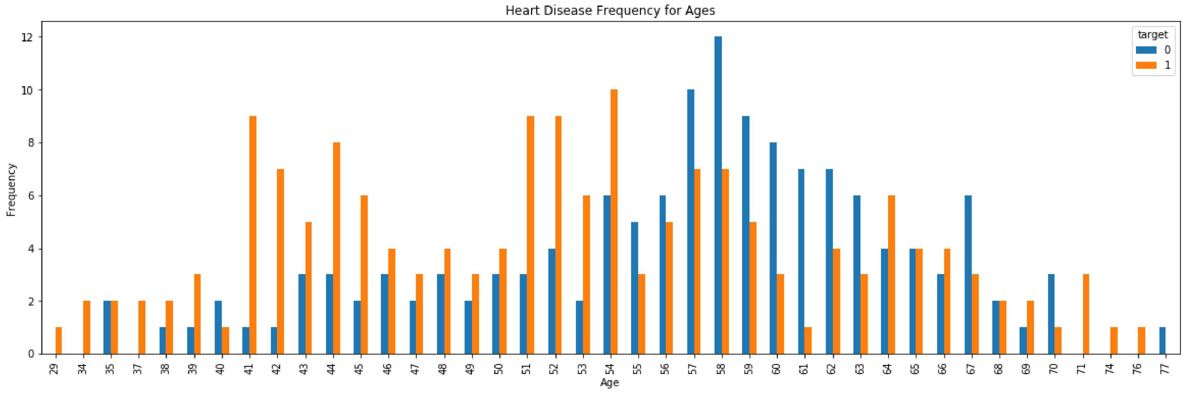
```
data.groupby('target').mean()
```

Out[18]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach
target								
0	56.601449	0.826087	0.478261	134.398551	251.086957	0.159420	0.449275	139.101449
1	52.496970	0.563636	1.375758	129.303030	242.230303	0.139394	0.593939	158.466667

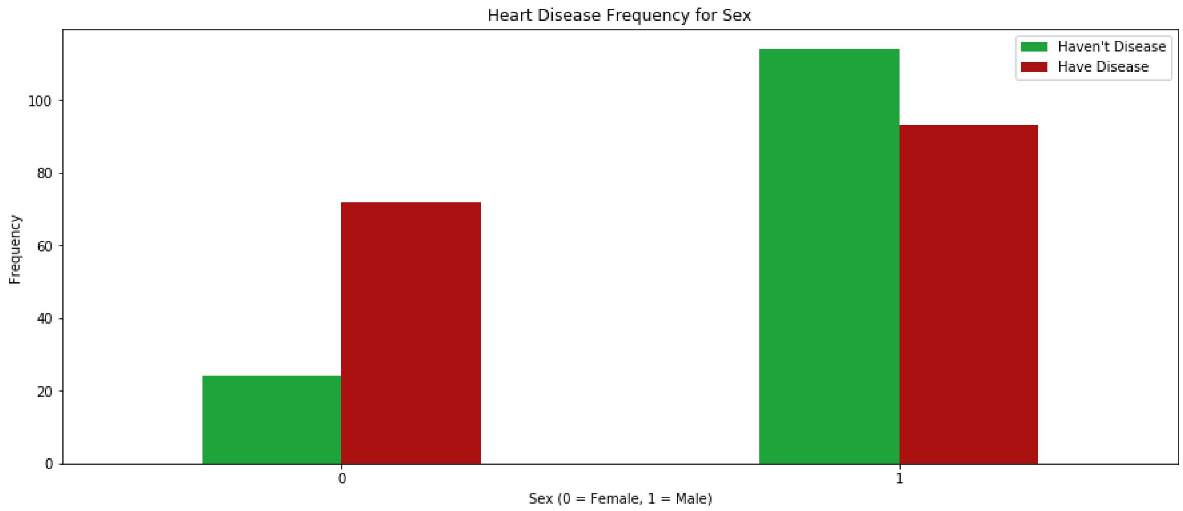
In [19]:

```
pd.crosstab(data.age,data.target).plot(kind="bar",figsize=(20,6))
plt.title('Heart Disease Frequency for Ages')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.savefig('heartDiseaseAndAges.png')
plt.show()
```



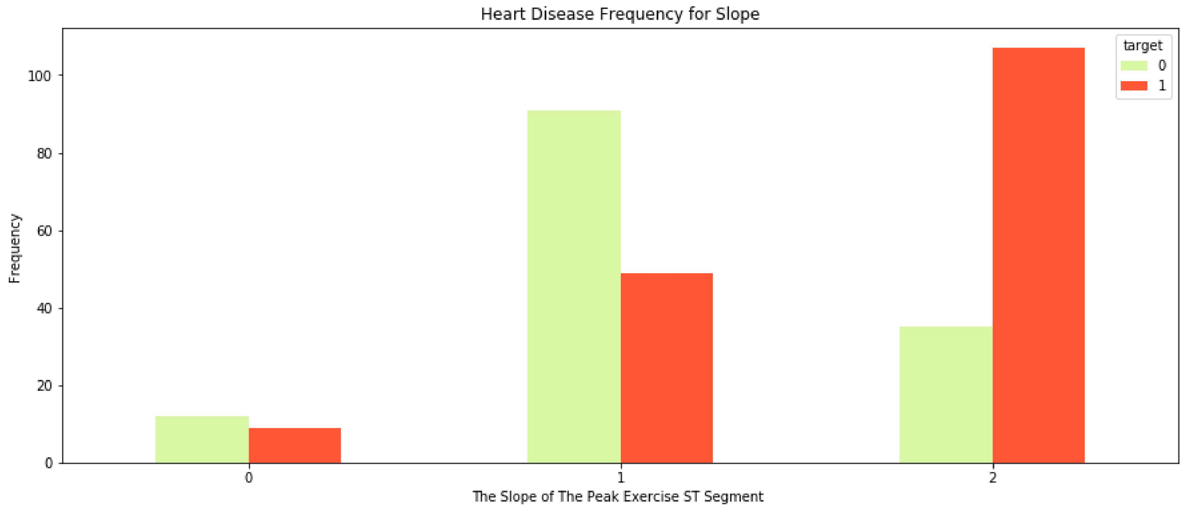
In [20]:

```
pd.crosstab(data.sex,data.target).plot(kind="bar",figsize=(15,6),color=['#1CA53B','#AA1111'
plt.title('Heart Disease Frequency for Sex')
plt.xlabel('Sex (0 = Female, 1 = Male)')
plt.xticks(rotation=0)
plt.legend(["Haven't Disease", "Have Disease"])
plt.ylabel('Frequency')
plt.show()
```



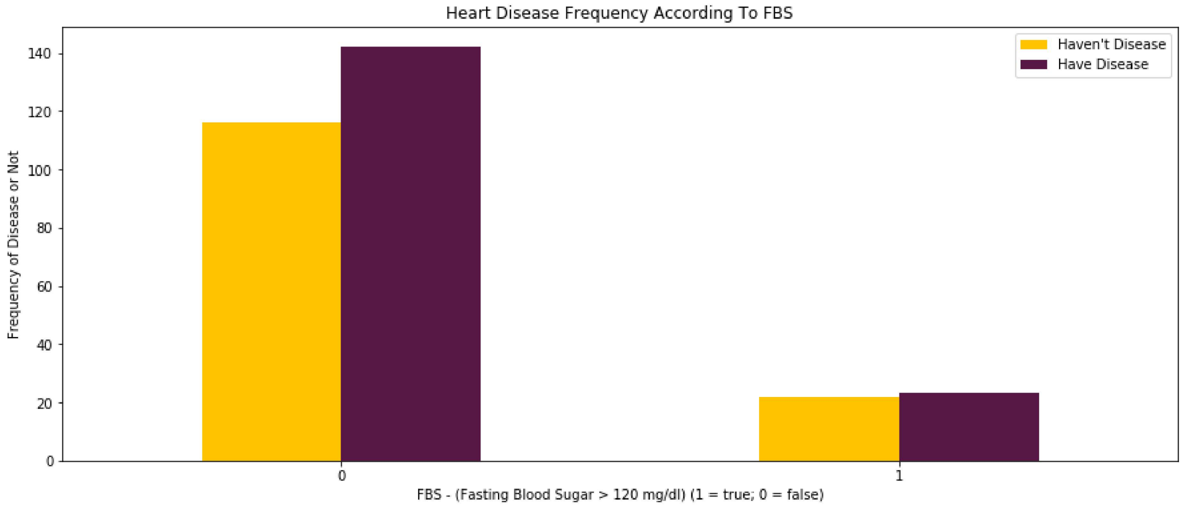
In [23]:

```
pd.crosstab(data.slope,data.target).plot(kind="bar",figsize=(15,6),color=['#DAF7A6','#FF573
plt.title('Heart Disease Frequency for Slope')
plt.xlabel('The Slope of The Peak Exercise ST Segment ')
plt.xticks(rotation = 0)
plt.ylabel('Frequency')
plt.show()
```



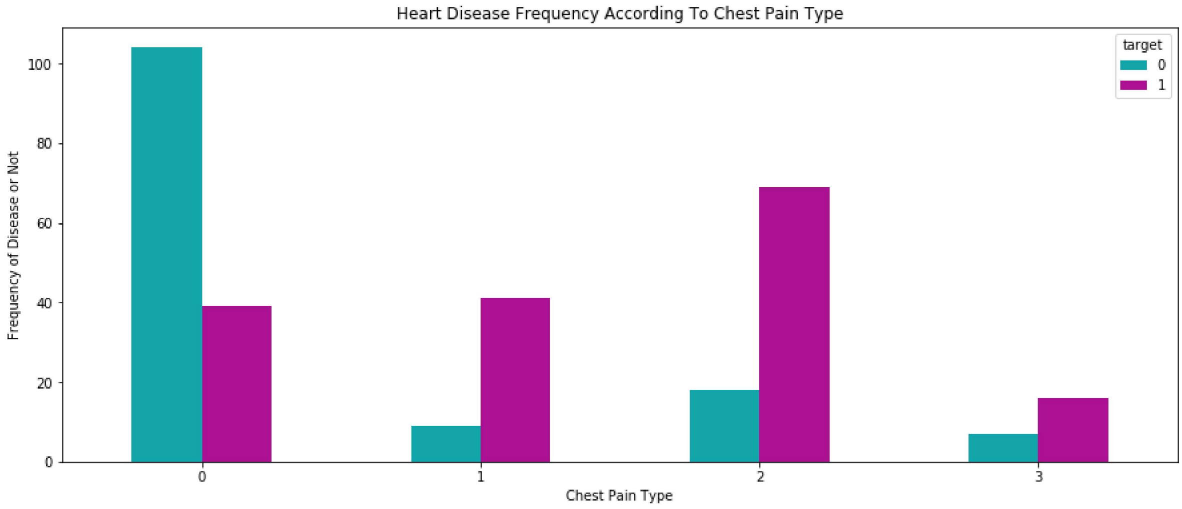
In [24]:

```
pd.crosstab(data.fbs,data.target).plot(kind="bar",figsize=(15,6),
color=['#FFC300','#581845' ])
plt.title('Heart Disease Frequency According To FBS')
plt.xlabel('FBS - (Fasting Blood Sugar > 120 mg/dl) (1 = true; 0 = false)')
plt.xticks(rotation = 0)
plt.legend(["Haven't Disease", "Have Disease"])
plt.ylabel('Frequency of Disease or Not')
plt.show()
```



In [25]:

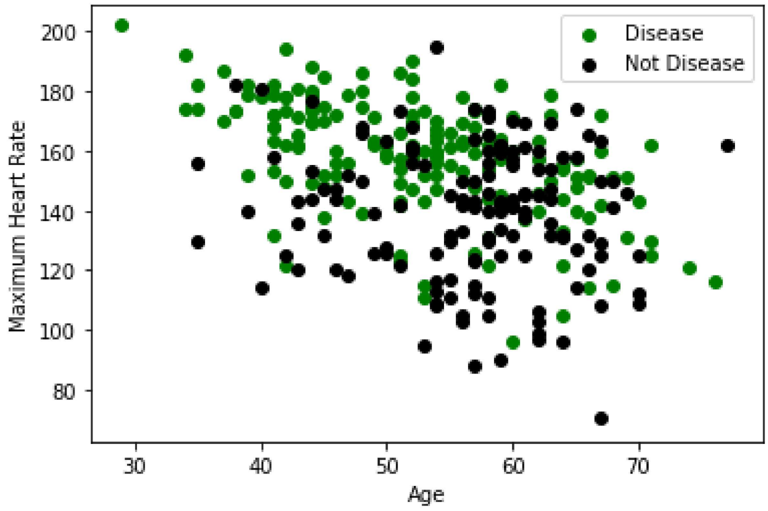
```
pd.crosstab(data.cp,data.target).plot(kind="bar",figsize=(15,6),color=['#11A5AA','#AA1190'
plt.title('Heart Disease Frequency According To Chest Pain Type')
plt.xlabel('Chest Pain Type')
plt.xticks(rotation = 0)
plt.ylabel('Frequency of Disease or Not')
plt.show()
```



Relation Between “Maximum Heart Rate” and “Age”

In [11]:

```
plt.scatter(x=data.age[data.target==1], y=data.thalach[(data.target==1)], c="green")
plt.scatter(x=data.age[data.target==0], y=data.thalach[(data.target==0)], c = 'black')
plt.legend(["Disease", "Not Disease"])
plt.xlabel("Age")
plt.ylabel("Maximum Heart Rate")
plt.show()
```



Confusion Matrix

In [12]:

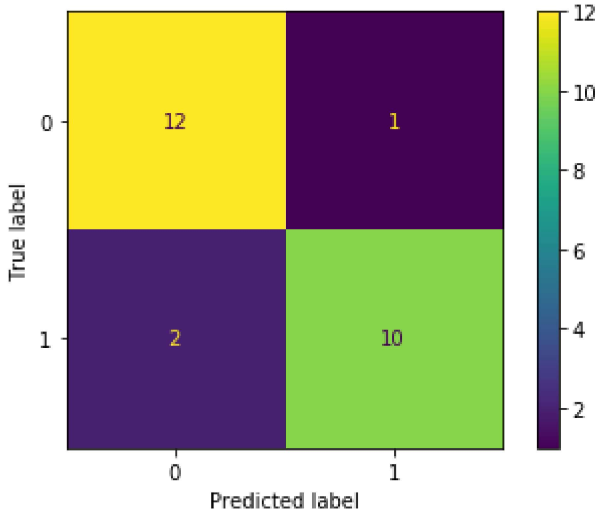
```
#confusion matrix
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
cm
```

Out[12]:

```
array([[25,  8],
       [ 3, 40]], dtype=int64)
```

In [13]:

```
import matplotlib.pyplot as plt  # doctest: +SKIP
from sklearn.datasets import make_classification
from sklearn.metrics import plot_confusion_matrix
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
X, y = make_classification(random_state=0)
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=0)
clf = SVC(random_state=0)
clf.fit(X_train, y_train)
SVC(random_state=0)
plot_confusion_matrix(clf, X_test, y_test)  # doctest: +SKIP
plt.show()  # doctest: +SKIP
```



In [15]:

```
healthy = data[(data['target'] ==0) ].count()[1]
sick = data[(data['target'] ==1) ].count()[1]
print ("num of pepole without heart deacise: "+ str(healthy))
print ("num of pepole with chance for heart deacise: "+ str(sick))
```

```
num of pepole without heart deacise: 138
num of pepole with chance for heart deacise: 165
```

In [ ]:

```
```