In [1]:
```
import pandas as pd

import numpy as np

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

In [2]:
```
df=pd.read_csv(r"chd.csv")
```

In [3]:
```
print(df.head())
```

```
   male  age  currentSmoker  cigsPerDay  BPMeds  prevalentStroke  \
0     1   39              0         0.0     0.0                0   
1     0   46              0         0.0     0.0                0   
2     1   48              1        20.0     0.0                0   
3     0   61              1        30.0     0.0                0   
4     0   46              1        23.0     0.0                0   

   prevalentHyp  diabetes  totChol  sysBP  diaBP   BMI  heartRate  glucose  \
0             0         0    195.0    106     70  27.0       80.0     77.0   
1             0         0    250.0    121     81  29.0       95.0     76.0   
2             0         0    245.0    128     80  25.0       75.0     70.0   
3             1         0    225.0    150     95  29.0       65.0    103.0   
4             0         0    285.0    130     84  23.0       85.0     85.0   

   TenYearCHD  
0           0  
1           0  
2           0  
3           1  
4           0  
```

In [4]:
```
print(df.dtypes)
```

```
male                 int64
age                  int64
currentSmoker        int64
cigsPerDay         float64
BPMeds             float64
prevalentStroke      int64
prevalentHyp         int64
diabetes             int64
totChol            float64
sysBP                int64
diaBP                int64
BMI                float64
heartRate          float64
glucose            float64
TenYearCHD           int64
dtype: object
```

In [5]:

```
print(df.info)
```

```
<bound method DataFrame.info of       male  age  currentSmoker  cigsPerDay  BPM
eds  prevalentStroke  \
0        1   39              0         0.0     0.0                0
1        0   46              0         0.0     0.0                0
2        1   48              1        20.0     0.0                0
3        0   61              1        30.0     0.0                0
4        0   46              1        23.0     0.0                0
...    ...  ...            ...         ...     ...              ...
4233     1   50              1         1.0     0.0                0
4234     1   51              1        43.0     0.0                0
4235     0   48              1        20.0     NaN                0
4236     0   44              1        15.0     0.0                0
4237     0   52              0         0.0     0.0                0

      prevalentHyp  diabetes  totChol  sysBP  diaBP   BMI  heartRate  glucose
\
0                0         0    195.0    106     70  27.0       80.0     77.0
1                0         0    250.0    121     81  29.0       95.0     76.0
2                0         0    245.0    128     80  25.0       75.0     70.0
3                1         0    225.0    150     95  29.0       65.0    103.0
4                0         0    285.0    130     84  23.0       85.0     85.0
...            ...       ...      ...    ...    ...   ...        ...      ...
4233             1         0    313.0    179     92  26.0       66.0     86.0
4234             0         0    207.0    127     80  20.0       65.0     68.0
4235             0         0    248.0    131     72  22.0       84.0     86.0
4236             0         0    210.0    127     87  19.0       86.0      NaN
4237             0         0    269.0    134     83  21.0       80.0    107.0

      TenYearCHD
0              0
1              0
2              0
3              1
4              0
...          ...
4233           1
4234           0
4235           0
4236           0
4237           0

[4238 rows x 15 columns]>
```

In [6]:
```
print(df.memory_usage())
```

```
Index                128
male               33904
age                33904
currentSmoker      33904
cigsPerDay         33904
BPMeds             33904
prevalentStroke    33904
prevalentHyp       33904
diabetes           33904
totChol            33904
sysBP              33904
diaBP              33904
BMI                33904
heartRate          33904
glucose            33904
TenYearCHD         33904
dtype: int64
```

In [7]:
```
print(df.memory_usage().sum())
```

```
508688
```

In [8]:
```
print(df.describe())
```

```
              male          age  currentSmoker   cigsPerDay       BPMeds  \
count  4238.000000  4238.000000    4238.000000  4209.000000  4185.000000   
mean      0.429212    49.584946       0.494101     9.003089     0.029630   
std       0.495022     8.572160       0.500024    11.920094     0.169584   
min       0.000000    32.000000       0.000000     0.000000     0.000000   
25%       0.000000    42.000000       0.000000     0.000000     0.000000   
50%       0.000000    49.000000       0.000000     0.000000     0.000000   
75%       1.000000    56.000000       1.000000    20.000000     0.000000   
max       1.000000    70.000000       1.000000    70.000000     1.000000   

       prevalentStroke  prevalentHyp     diabetes      totChol        sysBP  \
count      4238.000000   4238.000000  4238.000000  4188.000000  4238.000000   
mean          0.005899      0.310524     0.025720   236.721585   132.449976   
std           0.076587      0.462763     0.158316    44.590334    22.036728   
min           0.000000      0.000000     0.000000   107.000000    84.000000   
25%           0.000000      0.000000     0.000000   206.000000   117.000000   
50%           0.000000      0.000000     0.000000   234.000000   128.000000   
75%           0.000000      1.000000     0.000000   263.000000   144.000000   
max           1.000000      1.000000     1.000000   696.000000   295.000000   

             diaBP          BMI    heartRate      glucose   TenYearCHD  
count  4238.000000  4219.000000  4237.000000  3850.000000  4238.000000  
mean     82.974280    25.808722    75.878924    81.966753     0.151958  
std      11.907065     4.091840    12.026596    23.959998     0.359023  
min      48.000000    16.000000    44.000000    40.000000     0.000000  
25%      75.000000    23.000000    68.000000    71.000000     0.000000  
50%      82.000000    25.000000    75.000000    78.000000     0.000000  
75%      90.000000    28.000000    83.000000    87.000000     0.000000  
max     143.000000    57.000000   143.000000   394.000000     1.000000  
```

In [9]:
```
df.mean()
```

Out[9]:
```
male                 0.429212
age                 49.584946
currentSmoker        0.494101
cigsPerDay           9.003089
BPMeds               0.029630
prevalentStroke      0.005899
prevalentHyp         0.310524
diabetes             0.025720
totChol            236.721585
sysBP              132.449976
diaBP               82.974280
BMI                 25.808722
heartRate           75.878924
glucose             81.966753
TenYearCHD           0.151958
dtype: float64
```

In [10]:
```
df['BMI'].mean()
```

Out[10]:
```
25.80872244607727
```

In [11]:
```
df.var()
```

Out[11]:
```
male                  0.245047
age                  73.481926
currentSmoker         0.250024
cigsPerDay          142.088631
BPMeds                0.028759
prevalentStroke       0.005866
prevalentHyp          0.214149
diabetes              0.025064
totChol            1988.297915
sysBP               485.617393
diaBP               141.778191
BMI                  16.743158
heartRate           144.639020
glucose             574.081513
TenYearCHD            0.128898
dtype: float64
```

In [12]:
```
df.skew()
```

Out[12]:
```
male                0.286135
age                 0.228146
currentSmoker       0.023606
cigsPerDay          1.247910
BPMeds              5.550010
prevalentStroke    12.909062
prevalentHyp        0.819278
diabetes            5.994378
totChol             0.871422
sysBP               1.143799
diaBP               0.714524
BMI                 0.984374
heartRate           0.644482
glucose             6.213402
TenYearCHD          1.939741
dtype: float64
```

In [13]:
```
df.kurtosis()
```

Out[13]:
```
male                -1.919033
age                 -0.989636
currentSmoker       -2.000387
cigsPerDay           1.023356
BPMeds              28.816384
prevalentStroke    164.721624
prevalentHyp        -1.329411
diabetes            33.948587
totChol              4.131582
sysBP                2.146845
diaBP                1.280286
BMI                  2.658429
heartRate            0.907483
glucose             58.674278
TenYearCHD           1.763428
dtype: float64
```

In [14]:

```
df.min()
```

Out[14]:

```
male                 0.0
age                 32.0
currentSmoker        0.0
cigsPerDay           0.0
BPMeds               0.0
prevalentStroke      0.0
prevalentHyp         0.0
diabetes             0.0
totChol            107.0
sysBP               84.0
diaBP               48.0
BMI                 16.0
heartRate           44.0
glucose             40.0
TenYearCHD           0.0
dtype: float64
```

In [15]:

```
df.max()
```

Out[15]:

```
male                 1.0
age                 70.0
currentSmoker        1.0
cigsPerDay          70.0
BPMeds               1.0
prevalentStroke      1.0
prevalentHyp         1.0
diabetes             1.0
totChol            696.0
sysBP              295.0
diaBP              143.0
BMI                 57.0
heartRate          143.0
glucose            394.0
TenYearCHD           1.0
dtype: float64
```

In [16]:
```
df.median()
```

Out[16]:
```
male                0.0
age                49.0
currentSmoker       0.0
cigsPerDay          0.0
BPMeds              0.0
prevalentStroke     0.0
prevalentHyp        0.0
diabetes            0.0
totChol           234.0
sysBP             128.0
diaBP              82.0
BMI                25.0
heartRate          75.0
glucose            78.0
TenYearCHD          0.0
dtype: float64
```

In [17]:
```
df.corr()
```

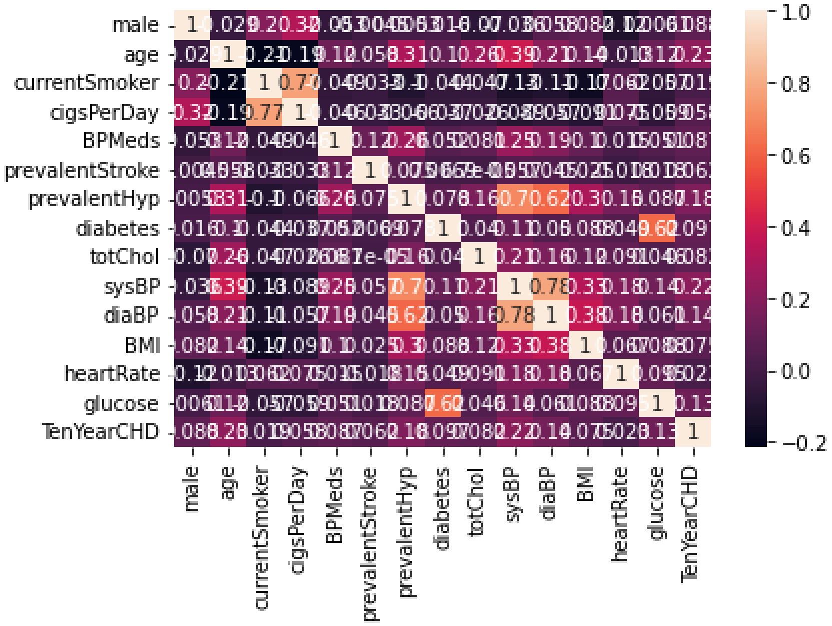
Out[17]:

	male	age	currentSmoker	cigsPerDay	BPMeds	prevalentStroke	preva
male	1.000000	-0.028979	0.197596	0.317930	-0.052506	-0.004546	(
age	-0.028979	1.000000	-0.213748	-0.192791	0.122995	0.057655	(
currentSmoker	0.197596	-0.213748	1.000000	0.769690	-0.048938	-0.032988	-(
cigsPerDay	0.317930	-0.192791	0.769690	1.000000	-0.046134	-0.032707	-(
BPMeds	-0.052506	0.122995	-0.048938	-0.046134	1.000000	0.117365	(
prevalentStroke	-0.004546	0.057655	-0.032988	-0.032707	0.117365	1.000000	(
prevalentHyp	0.005313	0.307194	-0.103260	-0.066146	0.261187	0.074830	1
diabetes	0.015708	0.101258	-0.044295	-0.037067	0.052047	0.006949	(
totChol	-0.070322	0.262131	-0.046562	-0.026320	0.080558	0.000067	(
sysBP	-0.035969	0.394061	-0.130298	-0.088785	0.253834	0.056741	(
diaBP	0.057892	0.205481	-0.108067	-0.056936	0.193806	0.044941	(
BMI	0.082145	0.135356	-0.166717	-0.090740	0.100340	0.024704	(
heartRate	-0.116620	-0.012823	0.062356	0.075157	0.015233	-0.017676	(
glucose	0.006083	0.122256	-0.056826	-0.058960	0.051176	0.018431	(
TenYearCHD	0.088428	0.225256	0.019456	0.057884	0.087489	0.061810	(

In [18]:
```
import seaborn as sns
```

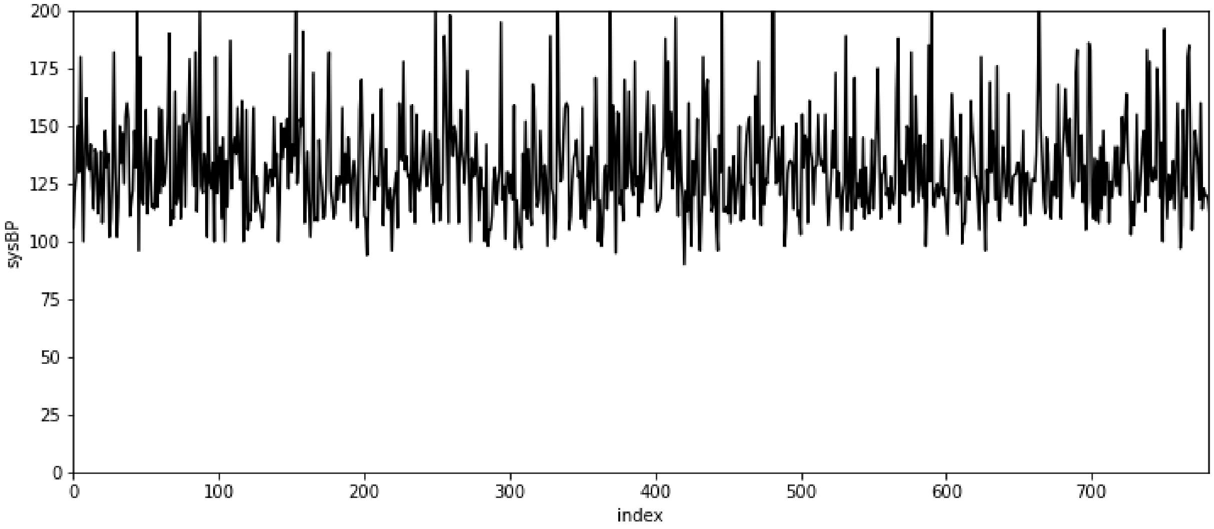
```
In [19]: sns.heatmap(df.corr(), annot=True)
```

```
Out[19]: <AxesSubplot:>
```



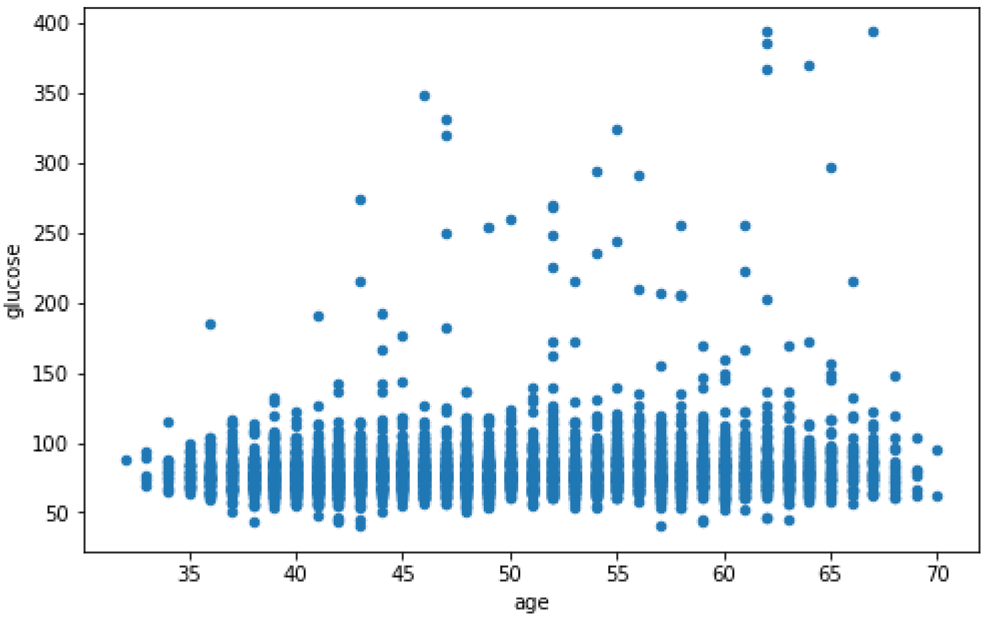
```
In [20]: df['sysBP'].plot(figsize=(12, 5), color='black') # color and figsize changed

         plt.xlim(0, 780) # range for x-axis
         plt.ylim(0, 200) # range for x-axis
         plt.xlabel('index')
         plt.ylabel('sysBP')
```

```
Out[20]: Text(0, 0.5, 'sysBP')
```

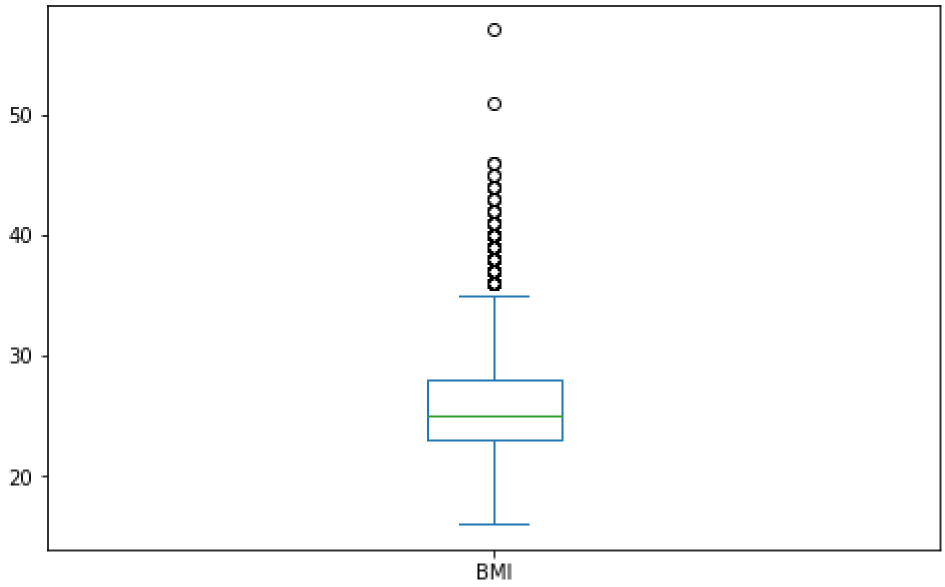


```
In [21]: df.plot.scatter('age', 'glucose', figsize=(8, 5))
```

```
Out[21]: <AxesSubplot:xlabel='age', ylabel='glucose'>
```

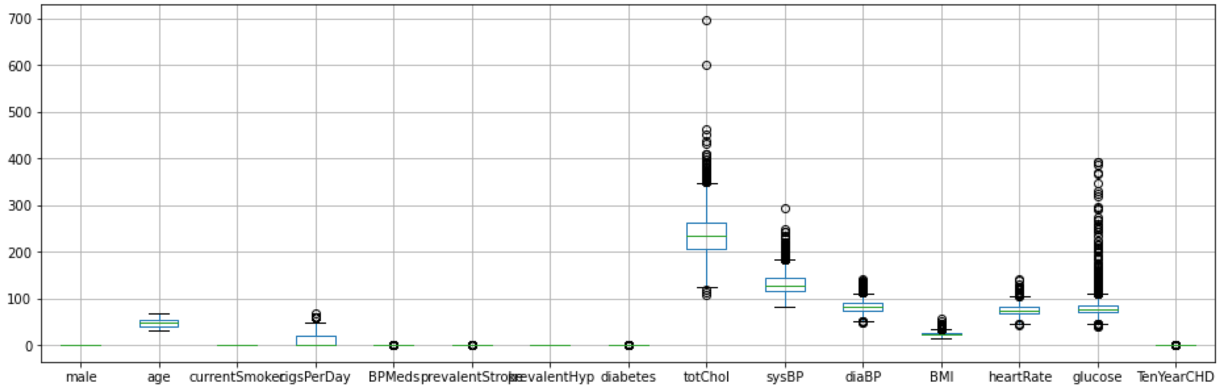


```
In [22]: df['BMI'].plot.box(figsize=(8, 5));
```

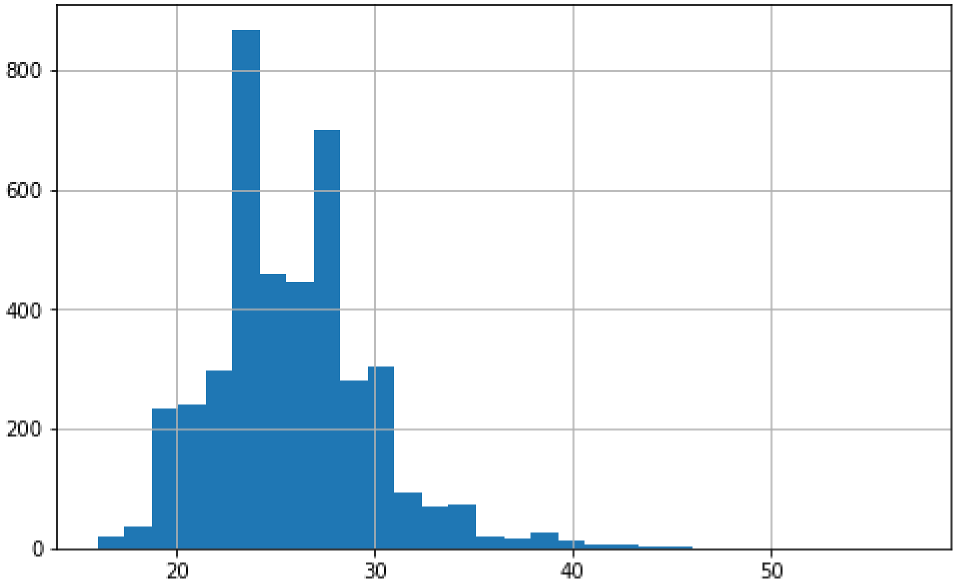


In [23]:
```
df.boxplot(figsize=(16, 5)) # or df.plot.box()
```

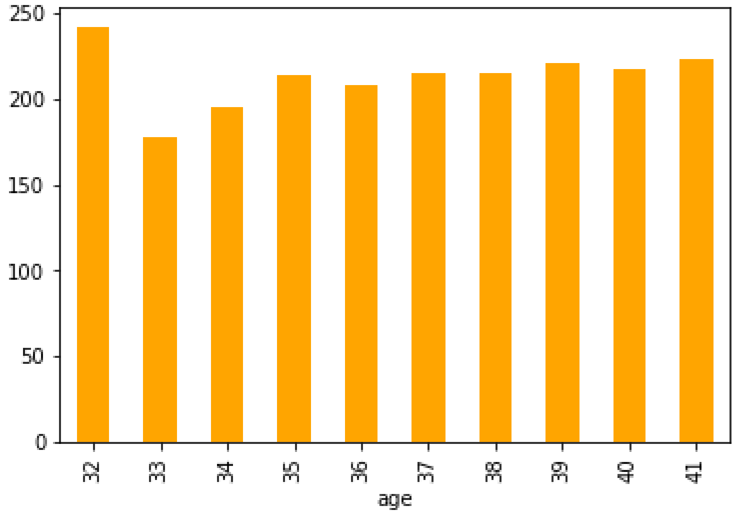
Out[23]:
```
<AxesSubplot:>
```



In [24]:
```
df['BMI'].hist(bins=30, figsize=(8, 5)); # we can specify the number of bins
```



In [25]:
```
df_avg_BP = df.groupby('age')['totChol'].mean()
df_avg_BP[:10].plot.bar(color='orange');
```



In [26]:
```
df=df.dropna()
```

In [27]:
```
df.isnull().sum()
```

Out[27]:
```
male               0
age                0
currentSmoker      0
cigsPerDay         0
BPMeds             0
prevalentStroke    0
prevalentHyp       0
diabetes           0
totChol            0
sysBP              0
diaBP              0
BMI                0
heartRate          0
glucose            0
TenYearCHD         0
dtype: int64
```

In [28]:
```
x = df[['glucose']]
y = df[['TenYearCHD']]
```

In [29]:
```
from sklearn.model_selection import train_test_split

x_train, x_test, y_train, y_test = train_test_split(x,y,test_size=0.2)
```

In [30]:
```
from sklearn.linear_model import LogisticRegression

model1=LogisticRegression()

model1.fit(x_train,y_train)
```

```
C:\Users\nisho\anaconda3\lib\site-packages\sklearn\utils\validation.py:63: Data
ConversionWarning: A column-vector y was passed when a 1d array was expected. P
lease change the shape of y to (n_samples, ), for example using ravel().
  return f(*args, **kwargs)
```

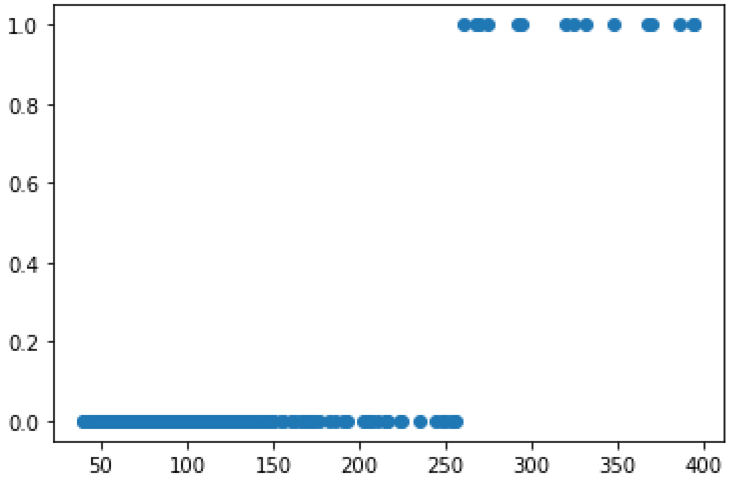
Out[30]:
```
LogisticRegression()
```

In [31]:
```
y_pred=model1.predict(x)
```

In [32]:
```
pred=model1.predict(x_test)
```

In [33]:
```
plt.scatter(df['glucose'], y_pred)
```

Out[33]:
```
<matplotlib.collections.PathCollection at 0x211c6972c70>
```



In [34]:
```
sample=model1.predict([[225]])
```

In [35]:
```
print(sample)
```

```
[0]
```

In [36]:

```
def prediction(sample):

  if model1.predict([sample])==0:
    print("No risk of CHD")

  else:
    print("Risk of CHD")
```

In [37]:

```
prediction([350])
```

```
Risk of CHD
```

In [38]:

```
from sklearn.metrics import accuracy_score
acc1 = accuracy_score(y,y_pred)
```

In [39]:

```
acc1
```

Out[39]:

```
0.848759669245132
```

In [ ]:

In [ ]: