Course 2 week 1 lecture notebook 01

Create a Linear Model

Linear model using scikit-learn

We'll practice using a scikit-learn model for linear regression. You will do something similar in this week's assignment (but with a logistic regression model).

sklearn.linear_model.LinearRegression() (https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.LinearRegression.html)

First, import `LinearRegression`, which is a Python 'class'.

In [1]:
```
# Import the module 'LinearRegression' from sklearn
from sklearn.linear_model import LinearRegression
```

Next, use the class to create an object of type LinearRegression.

In [2]:
```
# Create an object of type LinearRegression
model = LinearRegression()
model
```

Out[2]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, nor
malize=False)
```

Generate some data by importing a module 'load_data', which is implemented for you. The features in `X' are:

- Age: (years)
- Systolic_BP: Systolic blood pressure (mmHg)
- Diastolic_BP: Diastolic blood pressure (mmHg)
- Cholesterol: (mg/DL)

The labels in `y` indicate whether the patient has a disease (diabetic retinopathy).

- y = 1 : patient has retinopathy.
- y = 0 : patient does not have retinopathy.

In [3]:
```
# Import the load_data function from the utils module
from utils import load_data
```

In [4]:
```
# Generate features and labels using the imported function
X, y = load_data(100)
```

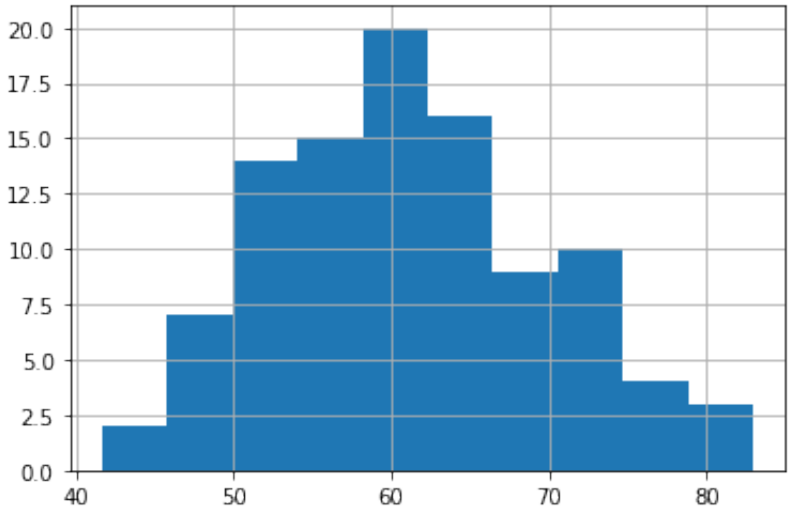
Explore the data by viewing the features and the labels

In [5]:
```
# View the features
X.head()
```

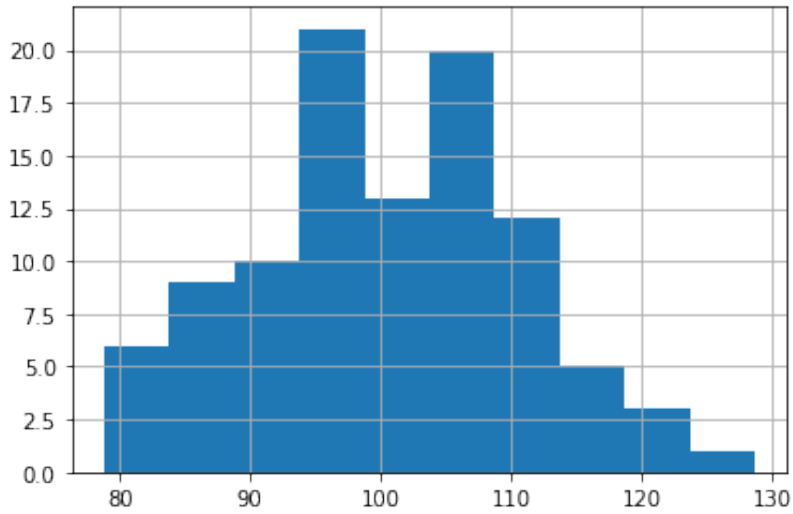
Out[5]:

	Age	Systolic_BP	Diastolic_BP	Cholesterol
0	77.196340	78.784208	87.026569	82.760275
1	63.529850	105.171676	83.396113	80.923284
2	69.003986	117.582259	91.161966	92.915422
3	82.638210	94.131208	69.470423	95.766098
4	78.346286	105.385186	87.250583	120.868124

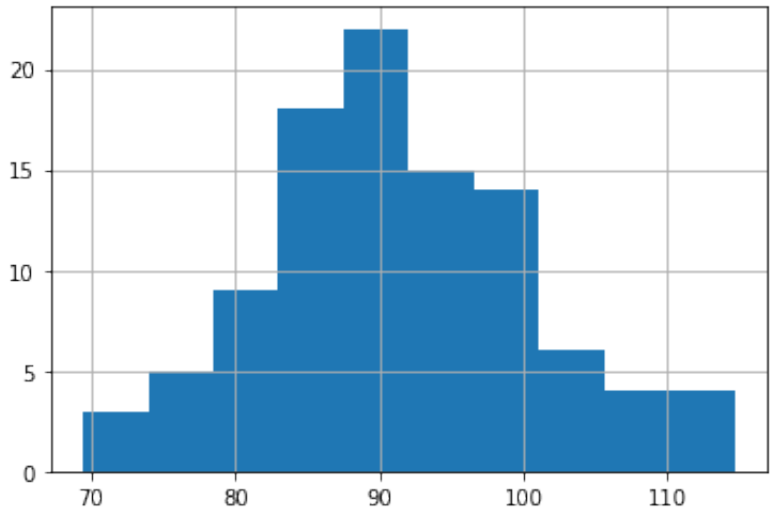
In [6]:
```
# Plot a histogram of the Age feature
X['Age'].hist();
```



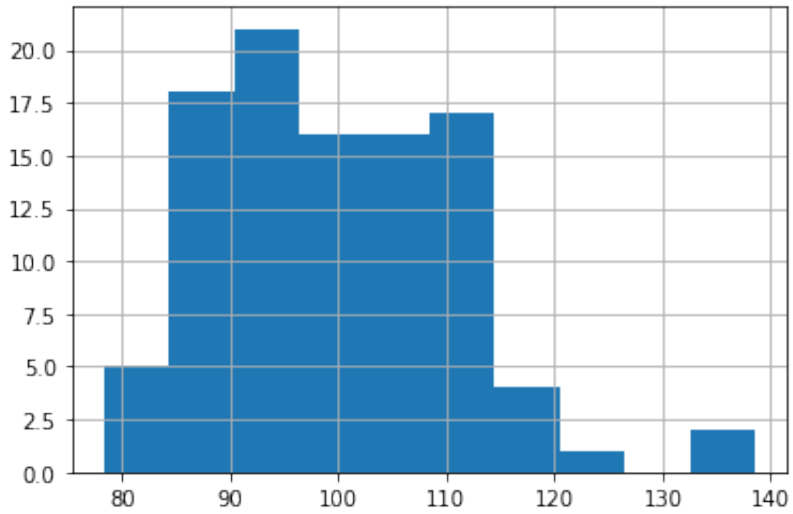
In [7]:
```
# Plot a histogram of the systolic blood pressure feature
X['Systolic_BP'].hist();
```



In [8]:
```
# Plot a histogram of the diastolic blood pressure feature
X['Diastolic_BP'].hist();
```



In [9]:
```
# Plot a histogram of the cholesterol feature
X['Cholesterol'].hist();
```

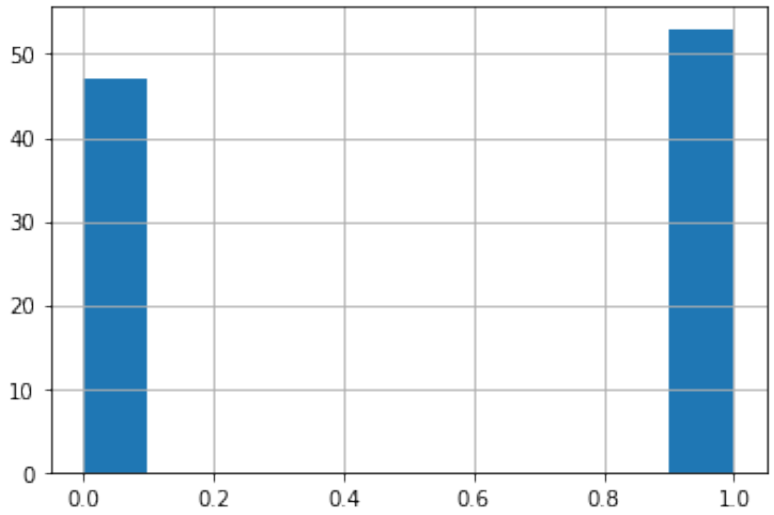


Also take a look at the labels

In [10]:
```
# View a few values of the labels
y.head()
```

Out[10]:
```
0    0.0
1    0.0
2    1.0
3    1.0
4    1.0
Name: y, dtype: float64
```

In [11]:
```
# Plot a histogram of the labels
y.hist();
```



Fit the LinearRegression using the features in `X` and the labels in `y`. To "fit" the model is another way of saying that we are training the model on the data.

In [12]:
```
# Fit the linear regression model
model.fit(X, y)
model
```

Out[12]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, nor
malize=False)
```

- View the coefficients of the trained model.
- The coefficients are the 'weights' or βs associated with each feature
- You'll use the coefficients for making predictions.

$$\hat{y} = \beta_1 x_1 + \beta_2 x_2 + \ldots \beta_N x_N$$

In [13]:
```
# View the coefficients of the model
model.coef_
```

Out[13]:
```
array([0.00975155, 0.00835816, 0.00836864, 0.00971064])
```

In the assignment, you will do something similar, but using a logistic regression, so that the output of the prediction will be bounded between 0 and 1.

This is the end of this practice section.

Please continue on with the lecture videos!
