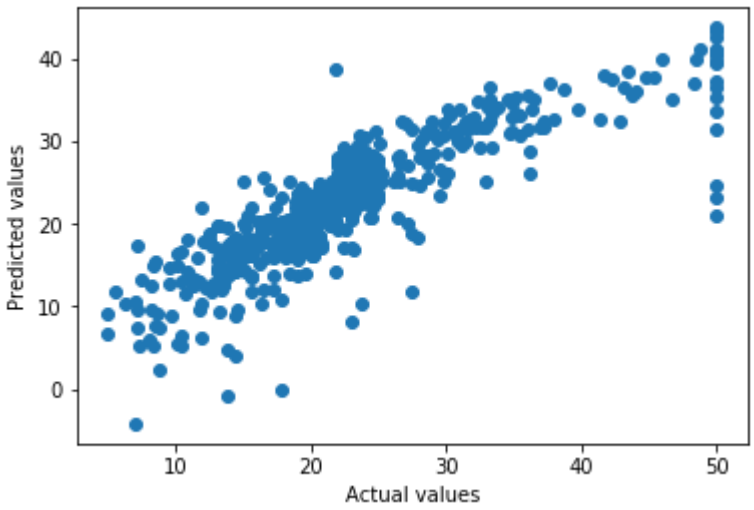
In [72]:
```
import warnings
warnings.filterwarnings("ignore")
from sklearn.datasets import load_boston
from random import seed
from random import randrange
from csv import reader
from math import sqrt
from sklearn import preprocessing
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import SGDRegressor
from sklearn import preprocessing
from sklearn.metrics import mean_squared_error
```

In [73]:
```
X = load_boston().data
Y = load_boston().target
```

In [74]:
```
scaler = preprocessing.StandardScaler().fit(X)
X = scaler.transform(X)
```

In [75]:
```
clf = SGDRegressor()
clf.fit(X, Y)
print("Coef:", clf.coef_)
MSE_SDG = mean_squared_error(Y, clf.predict(X))
print("MSE_SDG: ", MSE_SDG)
plt.scatter(Y, clf.predict(X))
plt.xlabel("Actual values")
plt.ylabel("Predicted values")
plt.show()
```

```
Coef: [-0.6422388   0.57451719 -0.34676674  0.77720229 -1.07618193  3.11815054
 -0.09238386 -1.95362935  0.71924754 -0.26845392 -1.90974563  0.85967728
 -3.52119796]
MSE_SDG:  22.89023925877556
```

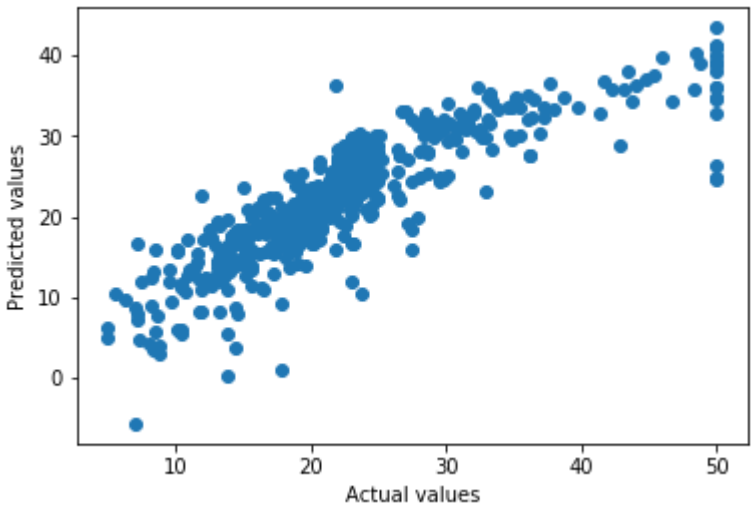


In [76]:
```
def stochastic_gradient_descent(x,y,w,b,learning_rate,iteration):
    for i in range(iteration):
        for row,target in zip(x,y):
            row=row.reshape(1,13)
            y_pred=row.dot(w)+b
            loss=y_pred-target
            w=w-2*learning_rate*(row.T.dot(loss))
            b=b-2*learning_rate*sum(loss)
    return w,b
```

In [77]:
```
# Taken array of 13 because we have 13 columns for which we have to find the weigh
w = np.zeros(13, dtype=int)
b=1
learning_rate = 0.001
iteration = 100
w, b = stochastic_gradient_descent(X, Y, w, b, learning_rate, iteration)
```

In [78]:
```
print("Coef: ", w)
print("Value of b: ", b)
MSE_NEW=mean_squared_error(Y, X.dot(w)+b)
print("MSE: ", MSE_NEW)
plt.scatter(Y, X.dot(w)+b)
plt.xlabel("Actual values")
plt.ylabel("Predicted values")
plt.show()
```

```
Coef:  [-1.14130069  0.92768563  0.13581293  0.81183038 -2.1005689   2.1904636
9
  0.11355834 -2.92935414  2.3492452  -1.77154744 -1.92764756  0.83742037
 -4.10046968]
Value of b:  22.177241888431823
MSE:  22.342617937984198
```



In [80]:
```
MSETable = pd.DataFrame({"Implementation" : ["SGDRegressor","SGD"],
                         "MSE" : [MSE_SDG, MSE_NEW]},
                        columns=["Implementation", "MSE"])
print(MSETable)
```

```
  Implementation        MSE
0   SGDRegressor  22.890239
1        Own SGD  22.342618
```