In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.metrics import r2_score
from sklearn.linear_model import LinearRegression
import statsmodels.formula.api as smf
```

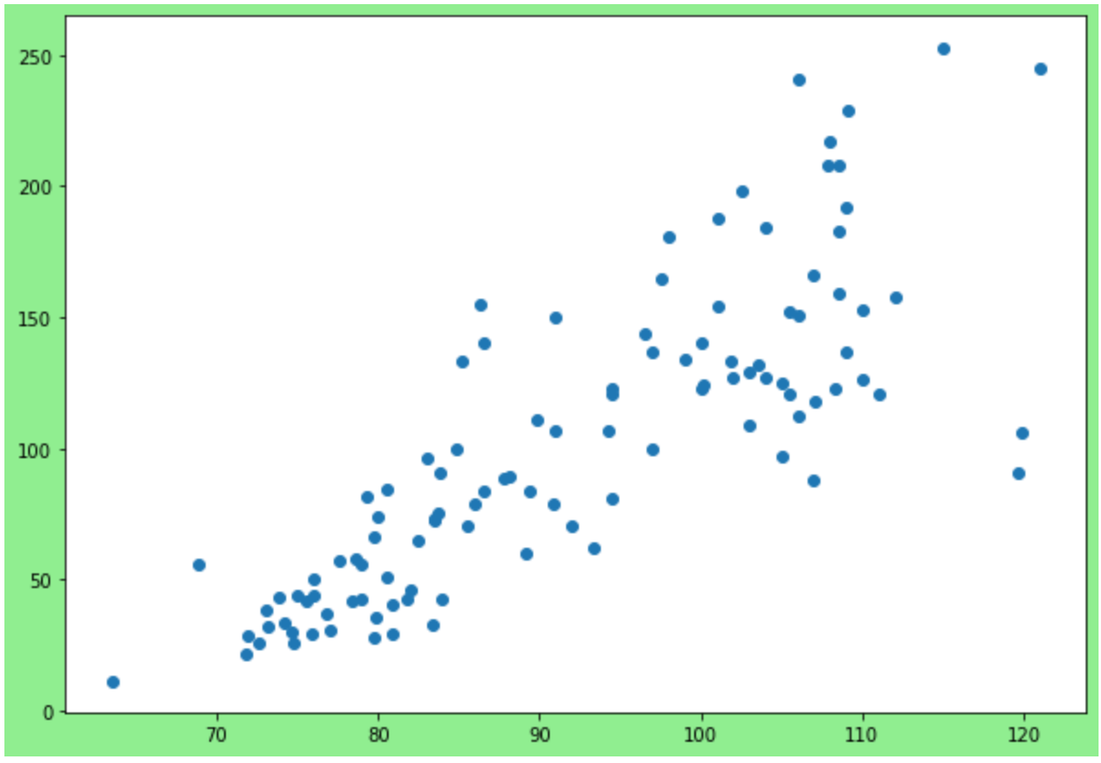
In [2]:
```
data=pd.read_csv('wc_at.csv')
data.head()
```

Out[2]:

	Waist	AT
0	74.75	25.72
1	72.60	25.89
2	81.80	42.60
3	83.95	42.80
4	74.65	29.84

In [3]:
```
plt.figure(figsize=(10,7),facecolor="lightgreen")
plt.scatter(data.Waist,data.AT)
```

Out[3]:
```
<matplotlib.collections.PathCollection at 0x19861a45bb0>
```



1.Method1

In [4]:
```
lm=LinearRegression()
```

In [5]:
```
x=data['Waist'].values.reshape(-1,1)
y=data['AT'].values.reshape(-1,1)
```

In [6]:
```
model=lm.fit(x,y)
```

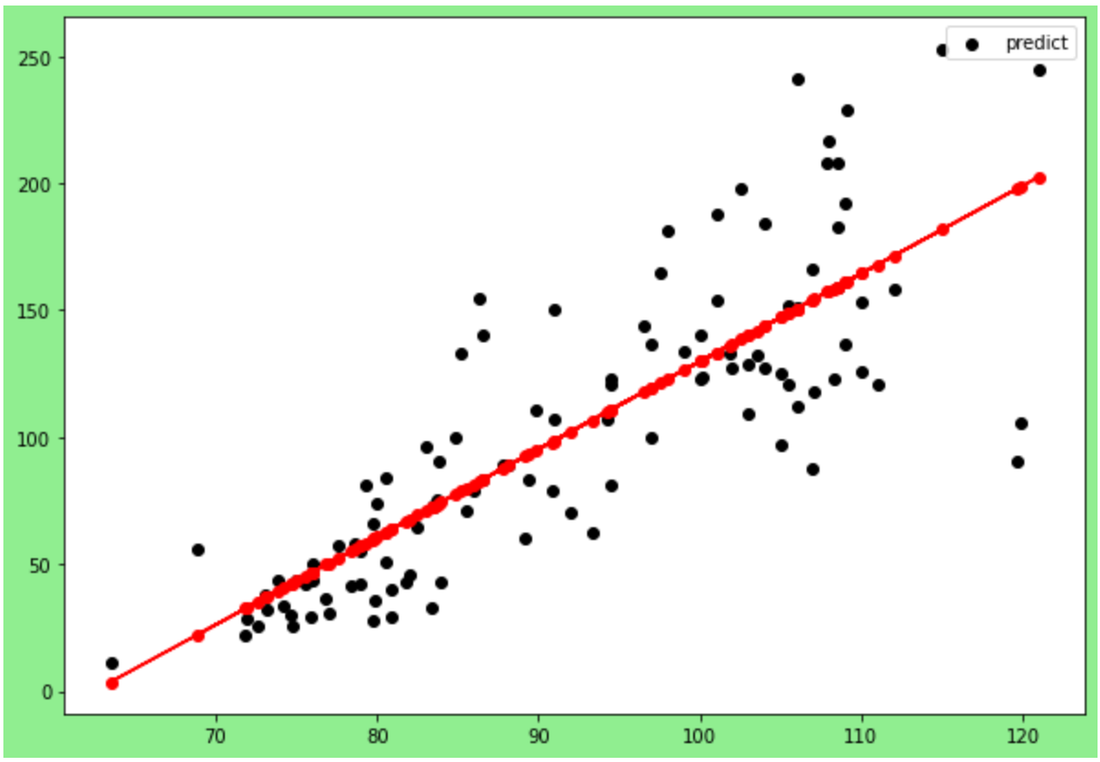
In [7]:
```
y_pred=model.predict(x)
```

In [8]:
```
print(model.coef_)
print(model.intercept_)
```

```
[[3.45885939]]
[-215.98148796]
```

In [9]:
```
plt.figure(figsize=(10,7),facecolor="lightgreen")
plt.scatter(data.Waist,data.AT,color="black",label="predict")
plt.plot(data.Waist,y_pred,color="red")
plt.scatter(data.Waist,y_pred,color="red")
plt.legend(loc="best")
```

Out[9]:
```
<matplotlib.legend.Legend at 0x19861c1dfa0>
```



In [10]:
```
r2_score(data['AT'],y_pred)
```

Out[10]:
```
0.6700368930528429
```

2.Method 2

In [11]:
```
data['Waist_sq']=data['Waist']**2
```

In [12]:
```
model=smf.ols("np.log(AT)~Waist+Waist_sq",data=data).fit()
```

In [13]:
```
model.summary()
```

Out[13]:

OLS Regression Results

Dep. Variable:	np.log(AT)	**R-squared:**	0.779
Model:	OLS	**Adj. R-squared:**	0.775
Method:	Least Squares	**F-statistic:**	186.8
Date:	Wed, 29 Jun 2022	**Prob (F-statistic):**	1.80e-35
Time:	18:38:06	**Log-Likelihood:**	-24.779
No. Observations:	109	**AIC:**	55.56
Df Residuals:	106	**BIC:**	63.63
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	-7.8241	1.473	-5.312	0.000	-10.744	-4.904
Waist	0.2289	0.032	7.107	0.000	0.165	0.293
Waist_sq	-0.0010	0.000	-5.871	0.000	-0.001	-0.001

Omnibus:	0.325	**Durbin-Watson:**	1.464
Prob(Omnibus):	0.850	**Jarque-Bera (JB):**	0.271
Skew:	0.119	**Prob(JB):**	0.873
Kurtosis:	2.949	**Cond. No.**	4.49e+05

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 4.49e+05. This might indicate that there are
strong multicollinearity or other numerical problems.