Simple linear regression - exercise

You are given a real estate dataset.

Real estate is one of those examples that every regression course goes through as it is extremely easy to understand and there is a (almost always) certain causal relationship to be found.

The data is located in the file: 'real_estate_price_size.csv'.

You are expected to create a simple linear regression (similar to the one in the lecture), using the new data.

In this exercise, the dependent variable is 'price', while the independent variables is 'size'.

Good luck!

Import the relevant libraries

In [3]:
```
import numpy as np #multidimensional arrays
import pandas as pd #format data into columns and rows
import matplotlib.pyplot as plt #2d visualization
import statsmodels.api as sm #summaries
import seaborn #nice graphs
seaborn.set()
```

Load the data

In [4]:
```
data = pd.read_csv('real_estate_price_size.csv')
```

In [22]:
```
data
```

Out[22]:

	price	size
0	234314.144	643.09
1	228581.528	656.22
2	281626.336	487.29
3	401255.608	1504.75
4	458674.256	1275.46
...	...	...
95	252460.400	549.80
96	310522.592	1037.44
97	383635.568	1504.75
98	225145.248	648.29
99	274922.856	705.29

100 rows × 2 columns

In [20]:
```
data.head()
```

Out[20]:

	price	size
0	234314.144	643.09
1	228581.528	656.22
2	281626.336	487.29
3	401255.608	1504.75
4	458674.256	1275.46

In [21]:
```
data.describe()
```

Out[21]:

	price	size
count	100.000000	100.000000
mean	292289.470160	853.024200
std	77051.727525	297.941951
min	154282.128000	479.750000
25%	234280.148000	643.330000
50%	280590.716000	696.405000
75%	335723.696000	1029.322500
max	500681.128000	1842.510000

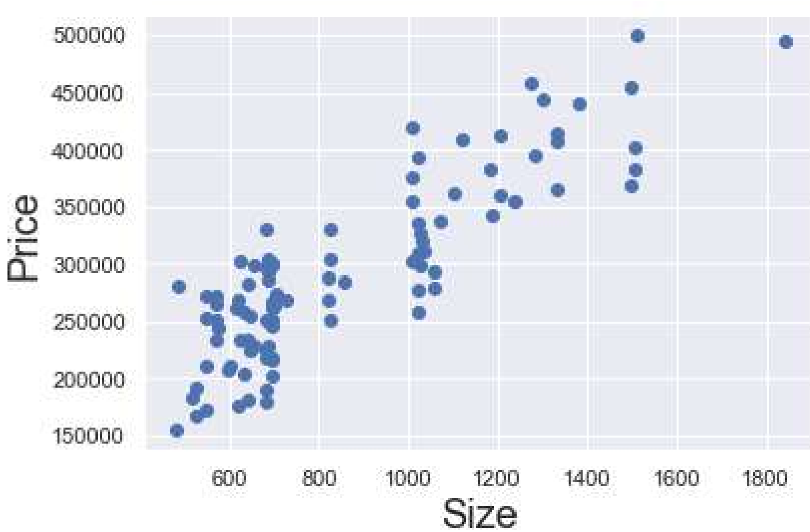
Create the regression

Declare the dependent and the independent variables

In [8]:
```
y = data['price']
x1 = data['size']
```

Explore the data

In [9]:
```
plt.scatter(x1,y)
plt.xlabel('Size',fontsize=20)
plt.ylabel('Price',fontsize=20)
plt.show()
```



Regression itself

In [10]:
```
x = sm.add_constant(x1)
results = sm.OLS(y,x).fit()
results.summary()
```

Out[10]:

OLS Regression Results

Dep. Variable:	price	**R-squared:**	0.745
Model:	OLS	**Adj. R-squared:**	0.742
Method:	Least Squares	**F-statistic:**	285.9
Date:	Wed, 25 Aug 2021	**Prob (F-statistic):**	8.13e-31
Time:	21:36:09	**Log-Likelihood:**	-1198.3
No. Observations:	100	**AIC:**	2401.
Df Residuals:	98	**BIC:**	2406.
Df Model:	1		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	1.019e+05	1.19e+04	8.550	0.000	7.83e+04	1.26e+05
size	223.1787	13.199	16.909	0.000	196.986	249.371

Omnibus:	6.262	**Durbin-Watson:**	2.267
Prob(Omnibus):	0.044	**Jarque-Bera (JB):**	2.938
Skew:	0.117	**Prob(JB):**	0.230
Kurtosis:	2.194	**Cond. No.**	2.75e+03

Warnings:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 2.75e+03. This might indicate that there are
strong multicollinearity or other numerical problems.

Plot the regression line on the initial scatter

In [12]:
```
plt.scatter(x1,y)
yhat = 223.1787*x1 + 101900
fig = plt.plot(x1, yhat, lw=4, c='red', label='regression line')
plt.xlabel('Size', fontsize=20)
plt.ylabel('Price', fontsize=20)
plt.show()
```