In [1]:
```
import pandas as pd
import numpy as np
import warnings
warnings.filterwarnings("ignore")

import os
os.chdir("/Users/Lenovo/Desktop/EBAC")
```

In [39]:
```
data = pd.read_csv("kc_house_data.csv")
data
```

Out[39]:

	id	date	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	...	grade	sq
0	7129300520	20141013T000000	221900.0	3	1.00	1180	5650	1.0	0	0	...	7	
1	6414100192	20141209T000000	538000.0	3	2.25	2570	7242	2.0	0	0	...	7	
2	5631500400	20150225T000000	180000.0	2	1.00	770	10000	1.0	0	0	...	6	
3	2487200875	20141209T000000	604000.0	4	3.00	1960	5000	1.0	0	0	...	7	
4	1954400510	20150218T000000	510000.0	3	2.00	1680	8080	1.0	0	0	...	8	
...	...	...	...	...	...	...	...	...	...	...	...	...	...
21608	263000018	20140521T000000	360000.0	3	2.50	1530	1131	3.0	0	0	...	8	
21609	6600060120	20150223T000000	400000.0	4	2.50	2310	5813	2.0	0	0	...	8	
21610	1523300141	20140623T000000	402101.0	2	0.75	1020	1350	2.0	0	0	...	7	
21611	291310100	20150116T000000	400000.0	3	2.50	1600	2388	2.0	0	0	...	8	
21612	1523300157	20141015T000000	325000.0	2	0.75	1020	1076	2.0	0	0	...	7	

21613 rows × 21 columns

In [153…
```
# Agregamos la columna de 1s (Intercepto)
data['intercepto'] = 1
data_limpia = data[['intercepto', 'bedrooms', 'bathrooms', 'sqft_living', 'sqft_lot', 'floors', 'waterfront', '
print(data_limpia.shape)
data_limpia.head()
```

```
(21613, 13)
```

Out[153…

	intercepto	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition	grade	lat	long	price
0	1	3	1.00	1180	5650	1.0	0	0	3	7	47.5112	-122.257	221900.0
1	1	3	2.25	2570	7242	2.0	0	0	3	7	47.7210	-122.319	538000.0
2	1	2	1.00	770	10000	1.0	0	0	3	6	47.7379	-122.233	180000.0
3	1	4	3.00	1960	5000	1.0	0	0	5	7	47.5208	-122.393	604000.0
4	1	3	2.00	1680	8080	1.0	0	0	3	8	47.6168	-122.045	510000.0

In [155…
```
# Asignamos las variables X y Y
Xdata = data_limpia[['intercepto', 'bedrooms', 'bathrooms', 'sqft_living', 'sqft_lot', 'floors', 'waterfront',
Ydata = data_limpia[['price']].values
```

In [157…
```
# Dividir bases de entrenamiento y prueba
from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(Xdata, Ydata, test_size = 0.2, random_state = 1)
```

In [159…
```
X = X_train
Y = Y_train
```

In [161…
```
# Opciones de formato numerico
np.set_printoptions(formatter = {'float_kind':'{:f}'.format})
```

In [163…
```
XT_X = np.matmul(np.matrix.transpose(X), X)
XT_X_inv = np.linalg.inv(XT_X)
XT_Y = np.matmul(np.matrix.transpose(X), Y)
betas = np.matmul(XT_X_inv, XT_Y)
```

In [165…
```
# TSS, ESS, RSS
TSS = np.matmul(np.matrix.transpose(Y), Y) - len(Y) * (Y.mean()**2)
ESS = np.matmul(np.matmul(np.matrix.transpose(betas), np.matrix.transpose(X)), np.matmul(X, betas)) - len(Y)*(Y
RSS = TSS - ESS
```

In [167…
```
# Calculo del coeficiente de determinacion de R2
RSq = 1 - (RSS/TSS)
```

```
RSq
```

Out[167… array([[0.676345]])

In [169…
```
# Calculo de  Coeficiente de Determinacion R Cuadrada Ajustada
RSqAj = 1 - (RSS / (X.shape[0] - X.shape[1])) / (TSS / (X.shape[0] - 1))
RSqAj
```

Out[169… array([[0.676139]])

In [171…
```
# Reporte Automatizado de la regresion en Python
import statsmodels.api as sm

regressor = sm.OLS(Y, X).fit()
print(regressor.summary())
```

```
                            OLS Regression Results
==============================================================================
Dep. Variable:                      y   R-squared:                       0.676
Model:                            OLS   Adj. R-squared:                  0.676
Method:                 Least Squares   F-statistic:                     3282.
Date:                Sat, 06 Sep 2025   Prob (F-statistic):               0.00
Time:                        22:47:15   Log-Likelihood:            -2.3569e+05
No. Observations:               17290   AIC:                         4.714e+05
Df Residuals:                   17278   BIC:                         4.715e+05
Df Model:                          11
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const      -5.741e+07   1.46e+06    -39.255      0.000   -6.03e+07   -5.45e+07
x1         -2.719e+04   2091.972    -12.998      0.000   -3.13e+04   -2.31e+04
x2         -1788.4161   3386.949     -0.528      0.597   -8427.179    4850.347
x3           193.2772      3.440     56.192      0.000     186.535     200.019
x4             0.0301      0.037      0.805      0.421      -0.043       0.103
x5         -1.064e+04   3493.274     -3.047      0.002   -1.75e+04   -3797.742
x6          5.535e+05   1.92e+04     28.898      0.000    5.16e+05    5.91e+05
x7          5.686e+04   2322.807     24.480      0.000    5.23e+04    6.14e+04
x8          5.057e+04   2467.119     20.500      0.000    4.57e+04    5.54e+04
x9          8.766e+04   2197.482     39.892      0.000    8.34e+04     9.2e+04
x10         6.425e+05   1.13e+04     56.736      0.000     6.2e+05    6.65e+05
x11        -2.147e+05   1.18e+04    -18.210      0.000   -2.38e+05   -1.92e+05
==============================================================================
Omnibus:                    11545.561   Durbin-Watson:                   2.028
Prob(Omnibus):                  0.000   Jarque-Bera (JB):           399554.637
Skew:                           2.727   Prob(JB):                         0.00
Kurtosis:                      25.910   Cond. No.                     4.34e+07
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 4.34e+07. This might indicate that there are
strong multicollinearity or other numerical problems.
```

In [173…
```
# Apliacion del modelo sobre la base de prueba
Y_pred = np.matmul(X_test, betas)
Y_pred
```

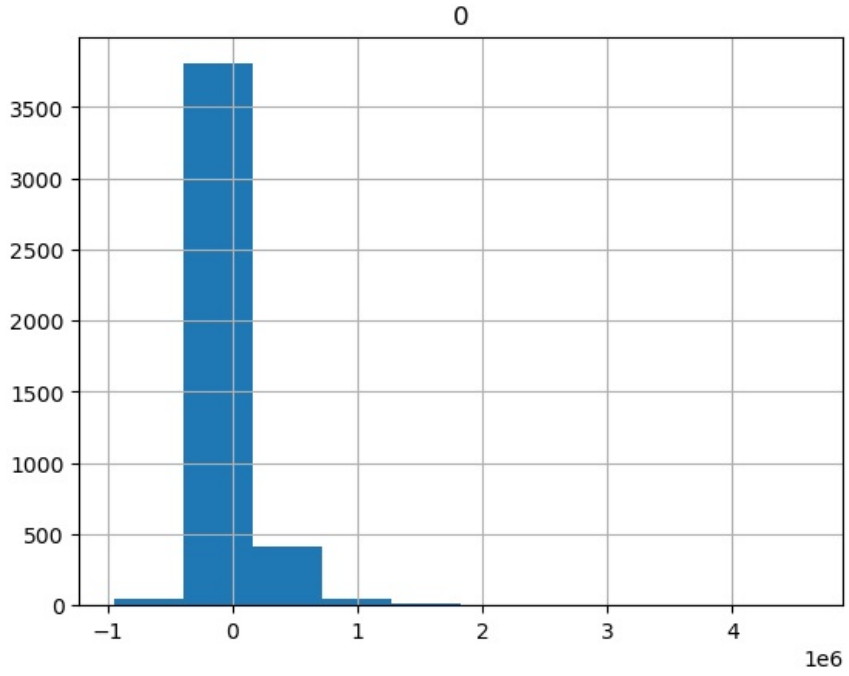
Out[173…
```
array([[629664.504457],
       [482437.700406],
       [726359.055207],
       ...,
       [340732.153261],
       [1326728.308202],
       [371544.516950]])
```

In [175…
```
# Calculo de residuales
Resid = Y_test - Y_pred
Resid
```

Out[175…
```
array([[-170664.504457],
       [-37437.700406],
       [330640.944793],
       ...,
       [-80732.153261],
       [468271.691798],
       [46455.483050]])
```

In [177…
```
# Grafico del histograma de residuales para la base de prueba
df = pd.DataFrame(Resid)
df.hist()
```

Out[177… array([[<Axes: title={'center': '0'}>]], dtype=object)



In [179…
```
from sklearn.metrics import r2_score
from sklearn import metrics
print("Coeficiente R Cuadrado", r2_score(Y_test, Y_pred))
```

```
Coeficiente R Cuadrado 0.6594039375429049
```

Conclusion

En este ejercicio pudimos encontrar que ambos modelos (el manual y el automatico) tienen el resultado muy similar, aunque tomamos las variables mas relevantes a la hora de elegir una casa, los modelos nos dan como resultado un 67.6% por lo que no se le pudiera considerar muy confiable, en este caso si tuvieramos una base mucho mas grande creo que el resultado podria mejorar.

In [ ]:
```
```