Problem Statement

A real estate agent want to help to predict the house price for regions in USA.He gave us the dataset to work on to use linear regression model.Create a model that helps to determine it.

Linear Regression

Import Libraries

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [3]:

```
a=pd.read_csv("house.csv")
a
```

Out[3]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
0	79545.45857	5.682861	7.009188	4.09	23086.80050	1.059034e+06	208 Michael Ferry Apt. 674\nLaurabury, NE 3701...
1	79248.64245	6.002900	6.730821	3.09	40173.07217	1.505891e+06	188 Johnson Views Suite 079\nLake Kathleen, CA...
2	61287.06718	5.865890	8.512727	5.13	36882.15940	1.058988e+06	9127 Elizabeth Stravenue\nDanieltown, WI 06482...
3	63345.24005	7.188236	5.586729	3.26	34310.24283	1.260617e+06	USS Barnett\nFPO AP 44820
4	59982.19723	5.040555	7.839388	4.23	26354.10947	6.309435e+05	USNS Raymond\nFPO AE 09386
...	...	...	...	...	...	...	...
4995	60567.94414	7.830362	6.137356	3.46	22837.36103	1.060194e+06	USNS Williams\nFPO AP 30153-7653
4996	78491.27543	6.999135	6.576763	4.02	25616.11549	1.482618e+06	PSC 9258, Box 8489\nAPO AA 42991-3352
4997	63390.68689	7.250591	4.805081	2.13	33266.14549	1.030730e+06	4215 Tracy Garden Suite 076\nJoshualand, VA 01...
4998	68001.33124	5.534388	7.130144	5.44	42625.62016	1.198657e+06	USS Wallace\nFPO AE 73316
4999	65510.58180	5.992305	6.792336	4.07	46501.28380	1.298950e+06	37778 George Ridges Apt. 509\nEast Holly,

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
							NV 2...

5000 rows × 7 columns

To display top 10 rows

In [4]:

```
a.head(10)
```

Out[4]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
0	79545.45857	5.682861	7.009188	4.09	23086.80050	1.059034e+06	208 Michael Ferry Apt. 674\nLaurabury, NE 3701...
1	79248.64245	6.002900	6.730821	3.09	40173.07217	1.505891e+06	188 Johnson Views Suite 079\nLake Kathleen, CA...
2	61287.06718	5.865890	8.512727	5.13	36882.15940	1.058988e+06	9127 Elizabeth Stravenue\nDanieltown, WI 06482...
3	63345.24005	7.188236	5.586729	3.26	34310.24283	1.260617e+06	USS Barnett\nFPO AP 44820
4	59982.19723	5.040555	7.839388	4.23	26354.10947	6.309435e+05	USNS Raymond\nFPO AE 09386
5	80175.75416	4.988408	6.104512	4.04	26748.42842	1.068138e+06	06039 Jennifer Islands Apt. 443\nTracyport, KS...
6	64698.46343	6.025336	8.147760	3.41	60828.24909	1.502056e+06	4759 Daniel Shoals Suite 442\nNguyenburgh, CO ...
7	78394.33928	6.989780	6.620478	2.42	36516.35897	1.573937e+06	972 Joyce Viaduct\nLake William, TN 17778-6483
8	59927.66081	5.362126	6.393121	2.30	29387.39600	7.988695e+05	USS Gilbert\nFPO AA 20957
9	81885.92718	4.423672	8.167688	6.10	40149.96575	1.545155e+06	Unit 9446 Box 0958\nDPO AE 97025

To find Missing values

In [5]:

```
a.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 7 columns):
 #   Column                        Non-Null Count  Dtype  
---  ------                        --------------  -----  
 0   Avg. Area Income              5000 non-null   float64
 1   Avg. Area House Age           5000 non-null   float64
 2   Avg. Area Number of Rooms     5000 non-null   float64
 3   Avg. Area Number of Bedrooms  5000 non-null   float64
 4   Area Population               5000 non-null   float64
 5   Price                         5000 non-null   float64
 6   Address                       5000 non-null   object 
dtypes: float64(6), object(1)
memory usage: 273.6+ KB
```

To display summary of statistics

In [7]:

```
a.describe()
```

Out[7]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price
count	5000.000000	5000.000000	5000.000000	5000.000000	5000.000000	5.000000e+03
mean	68583.108984	5.977222	6.987792	3.981330	36163.516039	1.232073e+06
std	10657.991214	0.991456	1.005833	1.234137	9925.650114	3.531176e+05
min	17796.631190	2.644304	3.236194	2.000000	172.610686	1.593866e+04
25%	61480.562390	5.322283	6.299250	3.140000	29403.928700	9.975771e+05
50%	68804.286405	5.970429	7.002902	4.050000	36199.406690	1.232669e+06
75%	75783.338665	6.650808	7.665871	4.490000	42861.290770	1.471210e+06
max	107701.748400	9.519088	10.759588	6.500000	69621.713380	2.469066e+06

To display column heading

In [8]:

```
a.columns
```

Out[8]:

```
Index(['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
       'Avg. Area Number of Bedrooms', 'Area Population', 'Price', 'Address'],
      dtype='object')
```

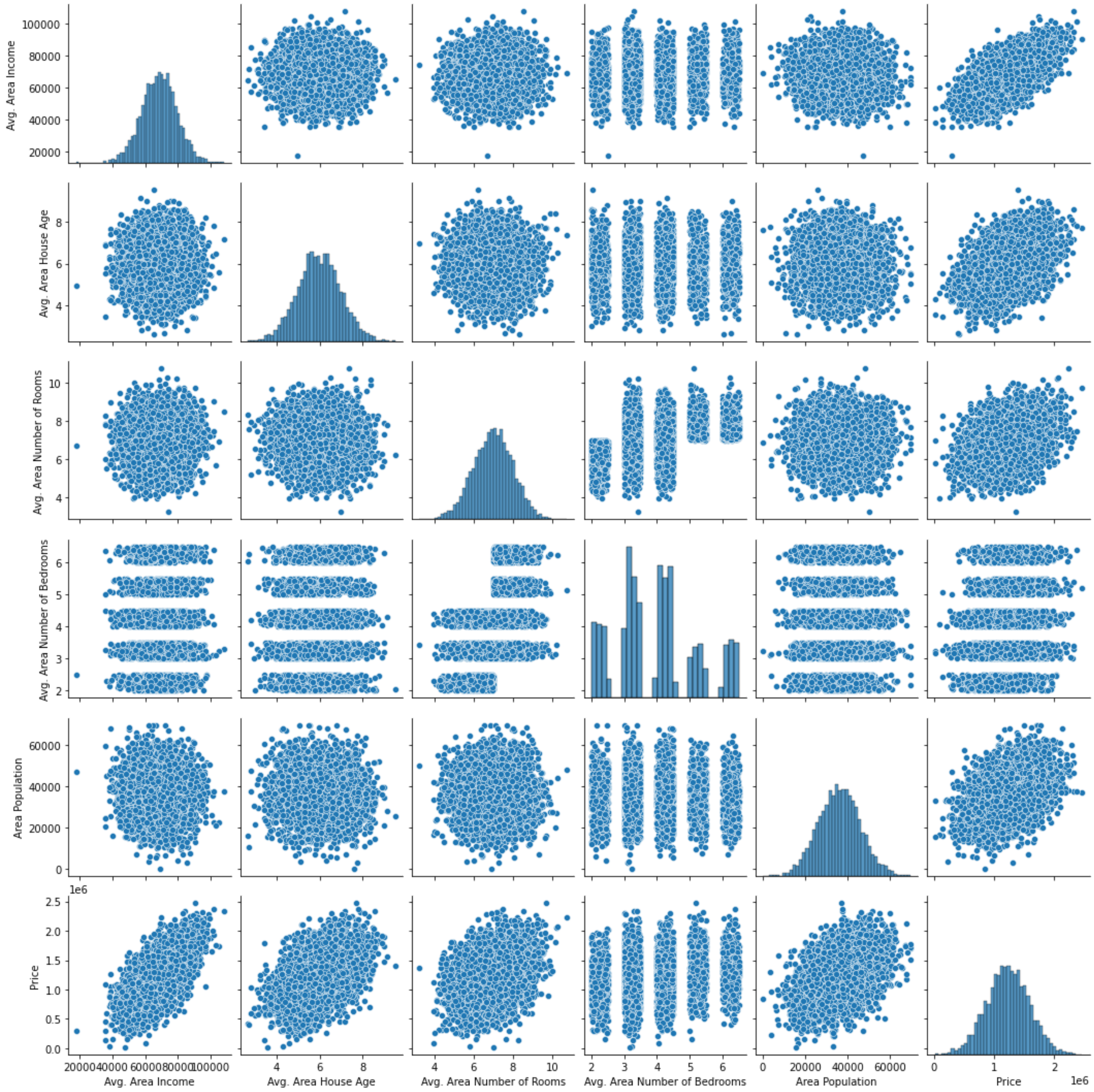
Pairplot

In [9]:

```
sns.pairplot(a)
```

Out[9]:

```
<seaborn.axisgrid.PairGrid at 0x20472ec8ac0>
```



Distribution Plot

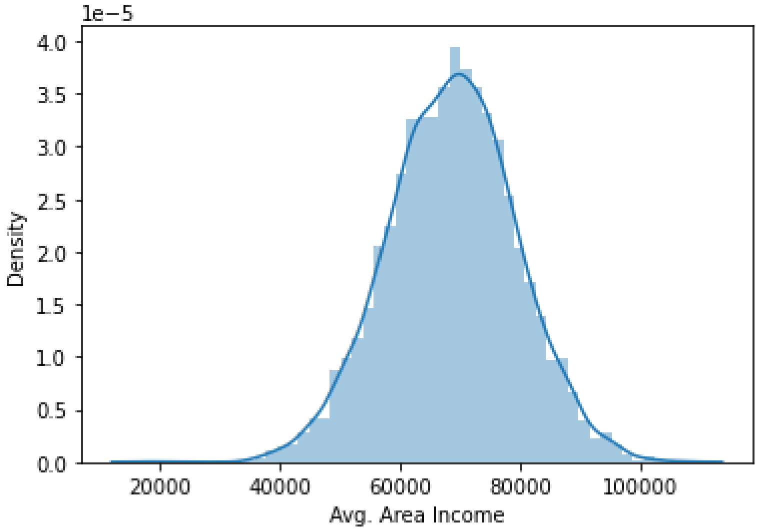
In [12]:

```
sns.distplot(a['Avg. Area Income'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557: FutureWarn
ing: `distplot` is a deprecated function and will be removed in a future version. Pl
ease adapt your code to use either `displot` (a figure-level function with similar f
lexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[12]:

```
<AxesSubplot:xlabel='Avg. Area Income', ylabel='Density'>
```



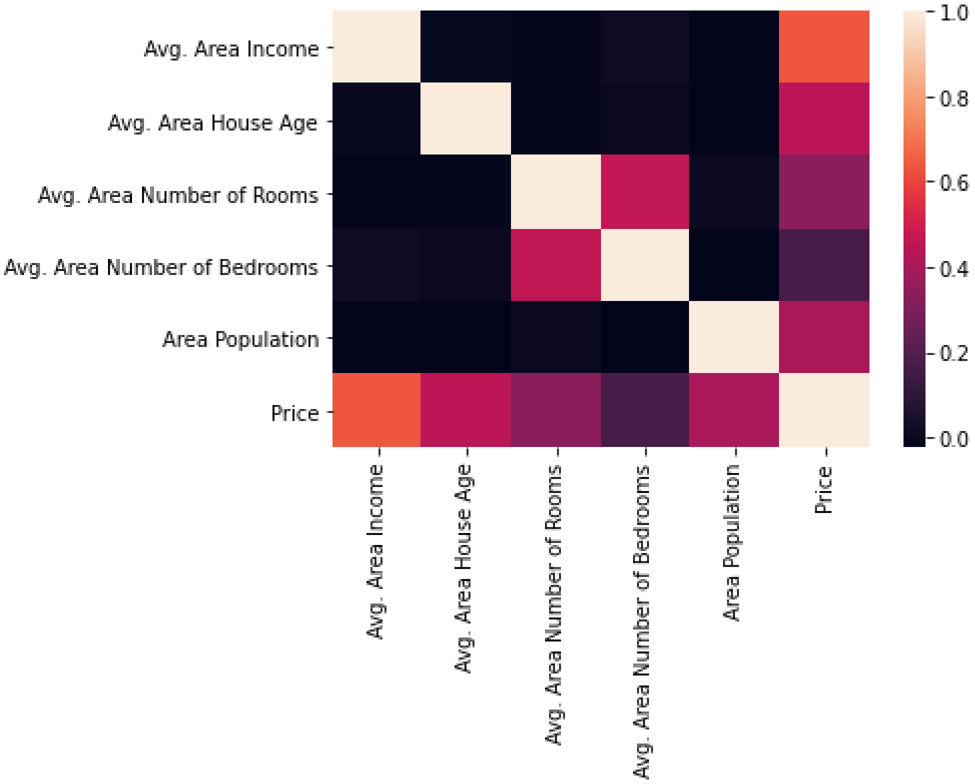
Correlation

In [13]:

```
b=a[['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
       'Avg. Area Number of Bedrooms', 'Area Population', 'Price', 'Address']]
sns.heatmap(b.corr())
```

Out[13]:

```
<AxesSubplot:>
```



Train the model - Model Building

We are going to train linear regression model: We need to split out data into 2 variables x,y where x is independant and y is dependant on x(output). We could ignore address column as it is not required for our model.

In [25]:

```
g=b[['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
      'Avg. Area Number of Bedrooms', 'Area Population']]
h=b['Price']
```

To split dataset into training end test

In [26]:

```
from sklearn.model_selection import train_test_split
g_train,g_test,h_train,h_test=train_test_split(g,h,test_size=0.5)
```

To run the model

In [20]:

```
from sklearn.linear_model import LinearRegression
```

In [27]:

```
lr=LinearRegression()
lr.fit(g_train,h_train)
```

Out[27]:

```
LinearRegression()
```

In [29]:

```
print(lr.intercept_)
```

```
-2656178.1464716895
```

Coeffecient

In [32]:

```
coeff=pd.DataFrame(lr.coef_,g.columns,columns=['Co-effecient'])
coeff
```

Out[32]:

	Co-effecient
Avg. Area Income	21.623153
Avg. Area House Age	167284.467720
Avg. Area Number of Rooms	121650.958678
Avg. Area Number of Bedrooms	1261.418030
Area Population	15.203649

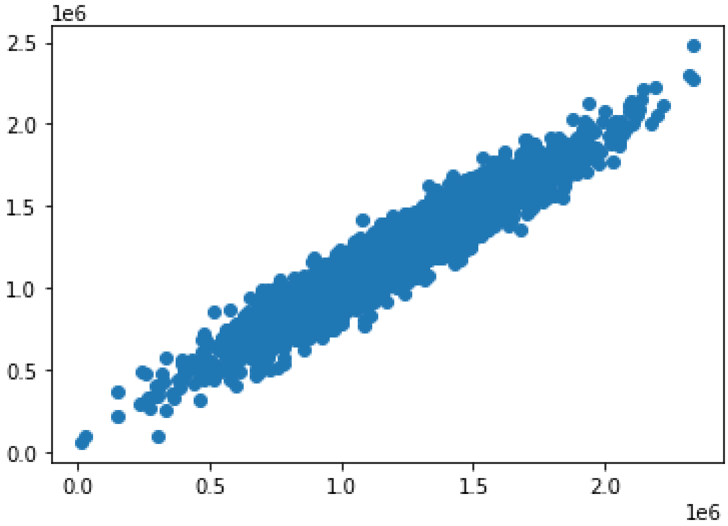
Best Fit line

In [34]:

```
prediction=lr.predict(g_test)
plt.scatter(h_test,prediction)
```

Out[34]:

```
<matplotlib.collections.PathCollection at 0x20477b97b80>
```



To find score

In [35]:

```
print(lr.score(g_test,h_test))
```

```
0.9122114121025614
```

In [ ]: