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

```
df = pd.read_csv("/House Price India.csv")
df.head()
```

	id	Date	number of bedrooms	number of bathrooms	living area	lot area	number of floors	waterfront present	number of views	condition of the house	...	Built Year	Renovation Year	Postal Code	Latt
0	6762810145	42491	5	2.50	3650	9050	2.0	0	4	5	...	1921	0	122003	52
1	6762810635	42491	4	2.50	2920	4000	1.5	0	0	5	...	1909	0	122004	52
2	6762810998	42491	5	2.75	2910	9480	1.5	0	0	3	...	1939	0	122004	52
3	6762812605	42491	4	2.50	3310	42998	2.0	0	0	3	...	2001	0	122005	52
4	6762812919	42491	3	2.00	2710	4500	1.5	0	0	4	...	1929	0	122006	52

5 rows × 23 columns

```
df.head()
```

	id	Date	number of bedrooms	number of bathrooms	living area	lot area	number of floors	waterfront present	number of views	condition of the house	...	Built Year	Renovation Year	Postal Code	Latt
0	6762810145	42491	5	2.50	3650	9050	2.0	0	4	5	...	1921	0	122003	52
1	6762810635	42491	4	2.50	2920	4000	1.5	0	0	5	...	1909	0	122004	52
2	6762810998	42491	5	2.75	2910	9480	1.5	0	0	3	...	1939	0	122004	52
3	6762812605	42491	4	2.50	3310	42998	2.0	0	0	3	...	2001	0	122005	52
4	6762812919	42491	3	2.00	2710	4500	1.5	0	0	4	...	1929	0	122006	52

5 rows × 23 columns

```
df.tail()
```

	id	Date	number of bedrooms	number of bathrooms	living area	lot area	number of floors	waterfront present	number of views	condition of the house	...	Built Year	Renovation Year	Postal Code	
14615	6762830250	42734	2	1.5	1556	20000	1.0	0	0	4	...	1957	0	122066	
14616	6762830339	42734	3	2.0	1680	7000	1.5	0	0	4	...	1968	0	122072	
14617	6762830618	42734	2	1.0	1070	6120	1.0	0	0	3	...	1962	0	122056	
14618	6762830709	42734	4	1.0	1030	6621	1.0	0	0	4	...	1955	0	122042	
14619	6762831463	42734	3	1.0	900	4770	1.0	0	0	3	...	1969	2009	122018	

5 rows × 23 columns

```
df.shape
```

```
(14620, 23)
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14620 entries, 0 to 14619
Data columns (total 23 columns):
 #   Column                         Non-Null Count  Dtype
---  ------                         --------------  -----
 0   id                             14620 non-null  int64
 1   Date                           14620 non-null  int64
 2   number of bedrooms             14620 non-null  int64
 3   number of bathrooms            14620 non-null  float64
 4   living area                    14620 non-null  int64
 5   lot area                       14620 non-null  int64
```

```
 6   number of floors                      14620 non-null  float64
 7   waterfront present                    14620 non-null  int64
 8   number of views                       14620 non-null  int64
 9   condition of the house                14620 non-null  int64
 10  grade of the house                    14620 non-null  int64
 11  Area of the house(excluding basement) 14620 non-null  int64
 12  Area of the basement                  14620 non-null  int64
 13  Built Year                            14620 non-null  int64
 14  Renovation Year                       14620 non-null  int64
 15  Postal Code                           14620 non-null  int64
 16  Lattitude                             14620 non-null  float64
 17  Longitude                             14620 non-null  float64
 18  living_area_renov                     14620 non-null  int64
 19  lot_area_renov                        14620 non-null  int64
 20  Number of schools nearby              14620 non-null  int64
 21  Distance from the airport             14620 non-null  int64
 22  Price                                 14620 non-null  int64
dtypes: float64(4), int64(19)
memory usage: 2.6 MB
```

```
df.isnull().any()
```

```
id                                    False
Date                                  False
number of bedrooms                    False
number of bathrooms                   False
living area                           False
lot area                              False
number of floors                      False
waterfront present                    False
number of views                       False
condition of the house                False
grade of the house                    False
Area of the house(excluding basement) False
Area of the basement                  False
Built Year                            False
Renovation Year                       False
Postal Code                           False
Lattitude                             False
Longitude                             False
living_area_renov                     False
lot_area_renov                        False
Number of schools nearby              False
Distance from the airport             False
Price                                 False
dtype: bool
```

```
df.isnull().sum()
```

```
id                                    0
Date                                  0
number of bedrooms                    0
number of bathrooms                   0
living area                           0
lot area                              0
number of floors                      0
waterfront present                    0
number of views                       0
condition of the house                0
grade of the house                    0
Area of the house(excluding basement) 0
Area of the basement                  0
Built Year                            0
Renovation Year                       0
Postal Code                           0
Lattitude                             0
Longitude                             0
living_area_renov                     0
lot_area_renov                        0
Number of schools nearby              0
Distance from the airport             0
Price                                 0
dtype: int64
```

```
df.describe()
```

	id	Date	number of bedrooms	number of bathrooms	living area	lot area	number of floors	waterfront present	number of views	
count	1.462000e+04	14620.000000	14620.000000	14620.000000	14620.000000	1.462000e+04	14620.000000	14620.000000	14620.000000	146
mean	6.762821e+09	42604.538646	3.379343	2.129583	2098.262996	1.509328e+04	1.502360	0.007661	0.233105	
std	6.237575e+03	67.347991	0.938719	0.769934	928.275721	3.791962e+04	0.540239	0.087193	0.766259	
min	6.762810e+09	42491.000000	1.000000	0.500000	370.000000	5.200000e+02	1.000000	0.000000	0.000000	

```
df.head()
```

	id	Date	number of bedrooms	number of bathrooms	living area	lot area	number of floors	waterfront present	number of views	condition of the house	...	Built Year	Renovation Year	Postal Code	Latt
0	6762810145	42491	5	2.50	3650	9050	2.0	0	4	5	...	1921	0	122003	52
1	6762810635	42491	4	2.50	2920	4000	1.5	0	0	5	...	1909	0	122004	52
2	6762810998	42491	5	2.75	2910	9480	1.5	0	0	3	...	1939	0	122004	52
3	6762812605	42491	4	2.50	3310	42998	2.0	0	0	3	...	2001	0	122005	52
4	6762812919	42491	3	2.00	2710	4500	1.5	0	0	4	...	1929	0	122006	52

5 rows × 23 columns

```
df.living_area_renov.nunique()
```

```
665
```

```
df.living_area_renov.unique()
```

```
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       1580, 3030, 1280, 1940, 1390, 2315, 2240, 2350, 2140, 4850, 1870,
       2610, 2720, 3100, 4420, 4530, 3430, 2550, 1670, 3070, 2020, 3180,
       2970, 1690, 2750, 2170, 3715, 1950, 2580, 1810, 3010, 1350, 1720,
       1800, 2840, 2330, 1060, 2160, 2030, 1880, 1520, 2500, 1290, 1470,
       1890, 1730, 2220, 1840, 2670, 1200, 1408, 1620, 1430, 1630, 1310,
       1760, 1820, 1220, 1980, 1130, 1170, 1510, 1240, 2488, 3510, 2490,
       2540, 2120, 2040, 3040, 3240, 3130, 3770, 2790, 2800, 2530, 2450,
       2520, 2770, 2000, 1780, 2210, 1420, 1660, 1970, 1270, 1460, 1500,
       1930, 1330, 1740, 1370, 2090, 1230, 2441,  840, 2360, 1650, 1490,
        900,  820, 1700, 4100, 2960, 3470, 3820, 2430, 4130, 2190, 1990,
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       1040, 1360, 1516, 2230, 2440, 2011, 1010, 1140, 1070,  910, 1326,
       3450, 2930, 2900, 3260, 2920, 2950, 3620, 1900, 1210, 3140, 2300,
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       3700, 2740, 2810, 2460, 2660, 1232,  850, 3490, 3150, 1445, 2114,
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```

```
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```

```
df.living_area_renov.unique()
```

```
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1800, 2840, 2330, 1060, 2160, 2030, 1880, 1520, 2500, 1290, 1470,
1890, 1730, 2220, 1840, 2670, 1200, 1408, 1620, 1430, 1630, 1310,
1760, 1820, 1220, 1980, 1130, 1170, 1510, 1240, 2488, 3510, 2490,
2540, 2120, 2040, 3040, 3240, 3130, 3770, 2790, 2800, 2530, 2450,
2520, 2770, 2000, 1780, 2210, 1420, 1660, 1970, 1270, 1460, 1500,
1930, 1330, 1740, 1370, 2090, 1230, 2441,  840, 2360, 1650, 1490,
 900,  820, 1700, 4100, 2960, 3470, 3820, 2430, 4130, 2190, 1990,
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3450, 2930, 2900, 3260, 2920, 2950, 3620, 1900, 1210, 3140, 2300,
1190, 2527, 2150, 2980, 1920, 1600, 1357, 1572, 4460, 3890, 3660,
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3700, 2740, 2810, 2460, 2660, 1232,  850, 3490, 3150, 1445, 2114,
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2258, 1427,  690,  620, 2405, 4200, 1415, 2547, 3087, 2091, 4650,
2822, 2961, 2647, 3870, 3726, 4600, 2765, 2242, 2728, 1056, 1429,
2604, 6110, 4220, 5340, 2255, 4730, 3413, 1886, 3515, 1321, 1677,
4250, 1425, 2697, 1654, 1162])
```

```
df.living_area_renov.value_counts()
```

```
1440    136
1540    131
1560    127
1500    122
1510    117
       ...
2029      1
2634      1
1137      1
1537      1
1162      1
Name: living_area_renov, Length: 665, dtype: int64
```

```
df.lot_area_renov.value_counts()
```

```
5000      301
4000      256
6000      179
7200      138
4800      102
          ...
12068       1
185565      1
60112       1
14564       1
6631        1
Name: lot_area_renov, Length: 6835, dtype: int64
```

```
df.Price.value_counts()
```

```
450000    114
350000    113
400000    104
375000    103
550000    102
          ...
561600      1
856500      1
907687      1
307999      1
146000      1
Name: Price, Length: 2901, dtype: int64
```

```
plt.pie(df.Price.value_counts())
```

```
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        Text(0.6319448335759175, -0.900358665930809, ''),
```
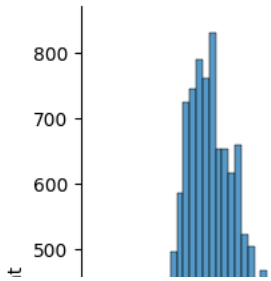
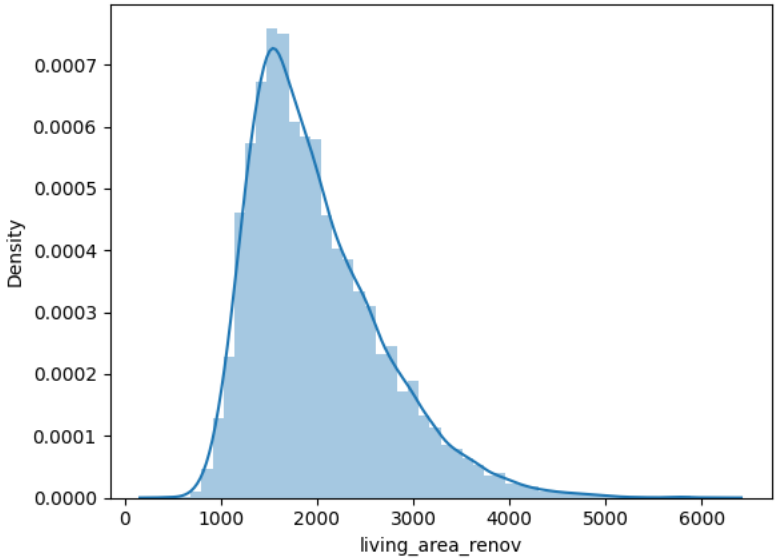

```
sns.displot(df.living_area_renov)
```

```
<seaborn.axisgrid.FacetGrid at 0x7c2ae15bf460>
```



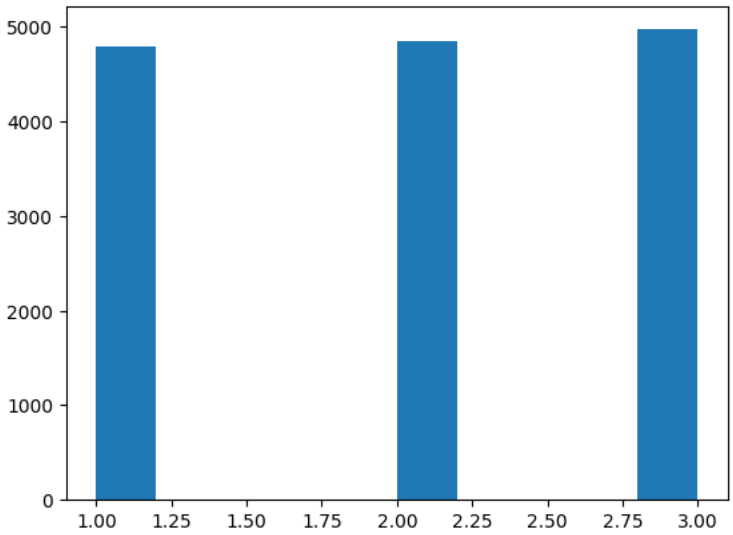

```
sns.distplot(df.living_area_renov)
```

```
<ipython-input-817-b944eacf0633>:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df.living_area_renov)
<Axes: xlabel='living_area_renov', ylabel='Density'>
```



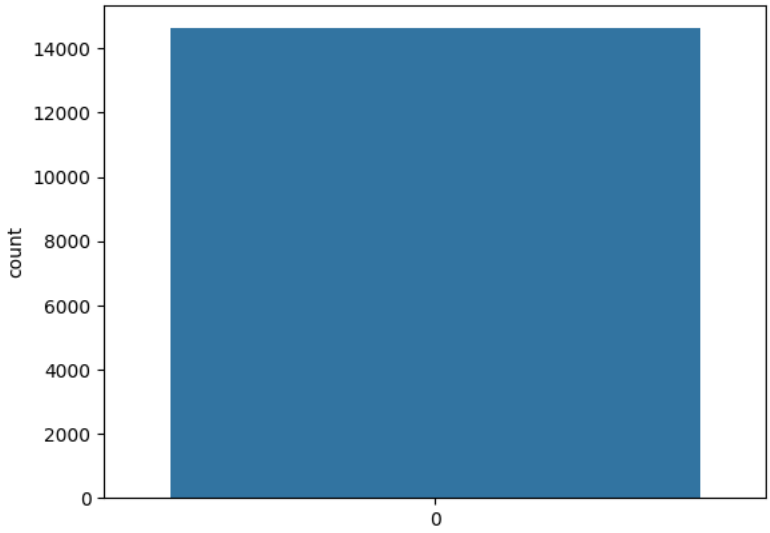

```
plt.hist(df['Number of schools nearby'])
```

```
(array([4794.,    0.,    0.,    0.,    0., 4853.,    0.,    0.,    0.,
        4973.]),
 array([1. , 1.2, 1.4, 1.6, 1.8, 2. , 2.2, 2.4, 2.6, 2.8, 3. ]),
 <BarContainer object of 10 artists>)
```



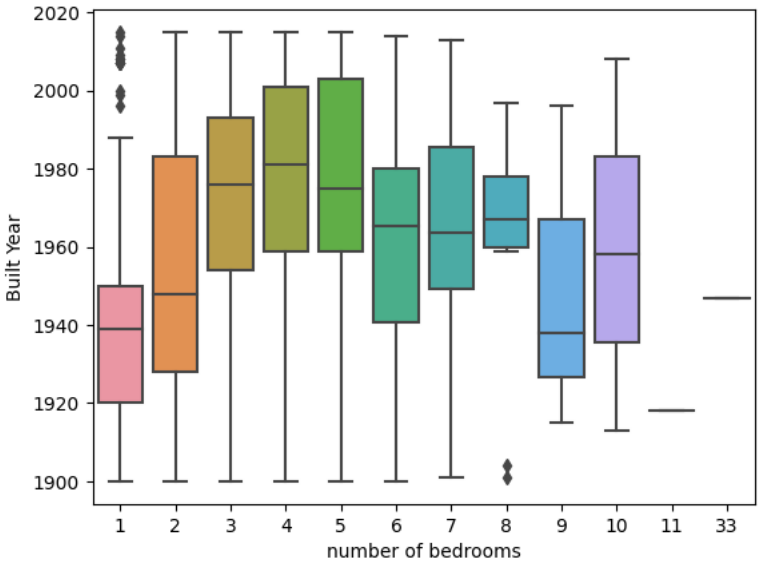

```
sns.countplot(df['number of bedrooms'])
```

```
<Axes: ylabel='count'>
```



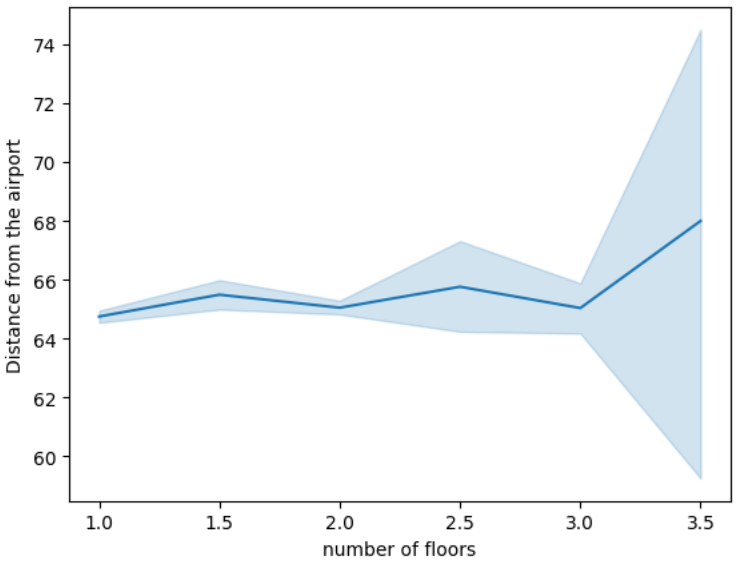

```
sns.boxplot(x=df['number of bedrooms'],y=df['Built Year'])
```

```
<Axes: xlabel='number of bedrooms', ylabel='Built Year'>
```



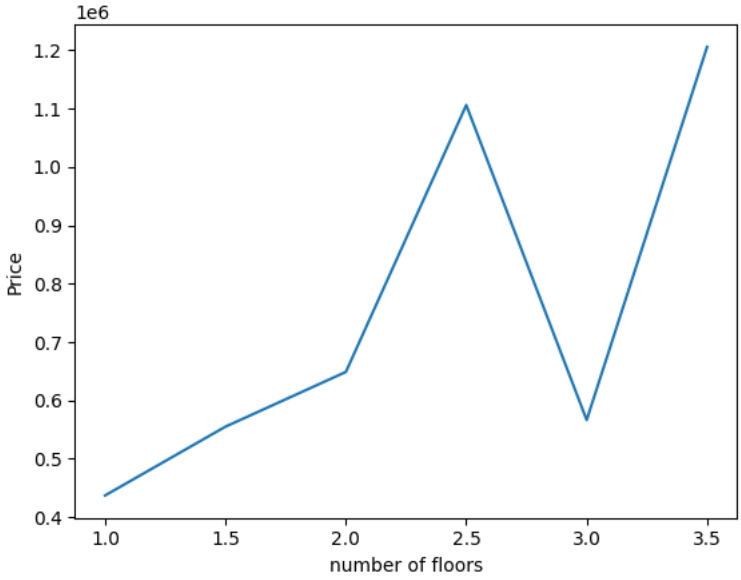

```
sns.lineplot(x=df['number of floors'],y=df['Distance from the airport'])
```

```
<Axes: xlabel='number of floors', ylabel='Distance from the airport'>
```



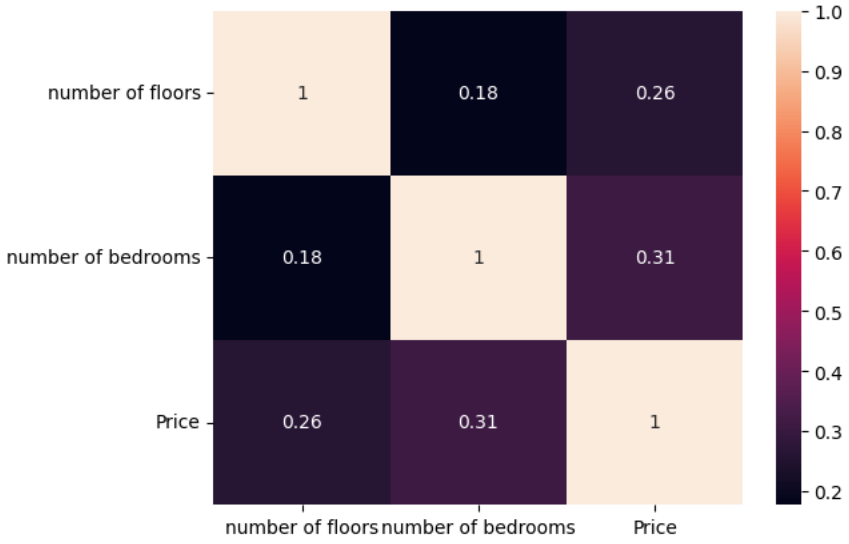

```
sns.lineplot(x=df.groupby('number of floors').mean().index,y=df.groupby('number of floors').mean()['Price'])
plt.show
```

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



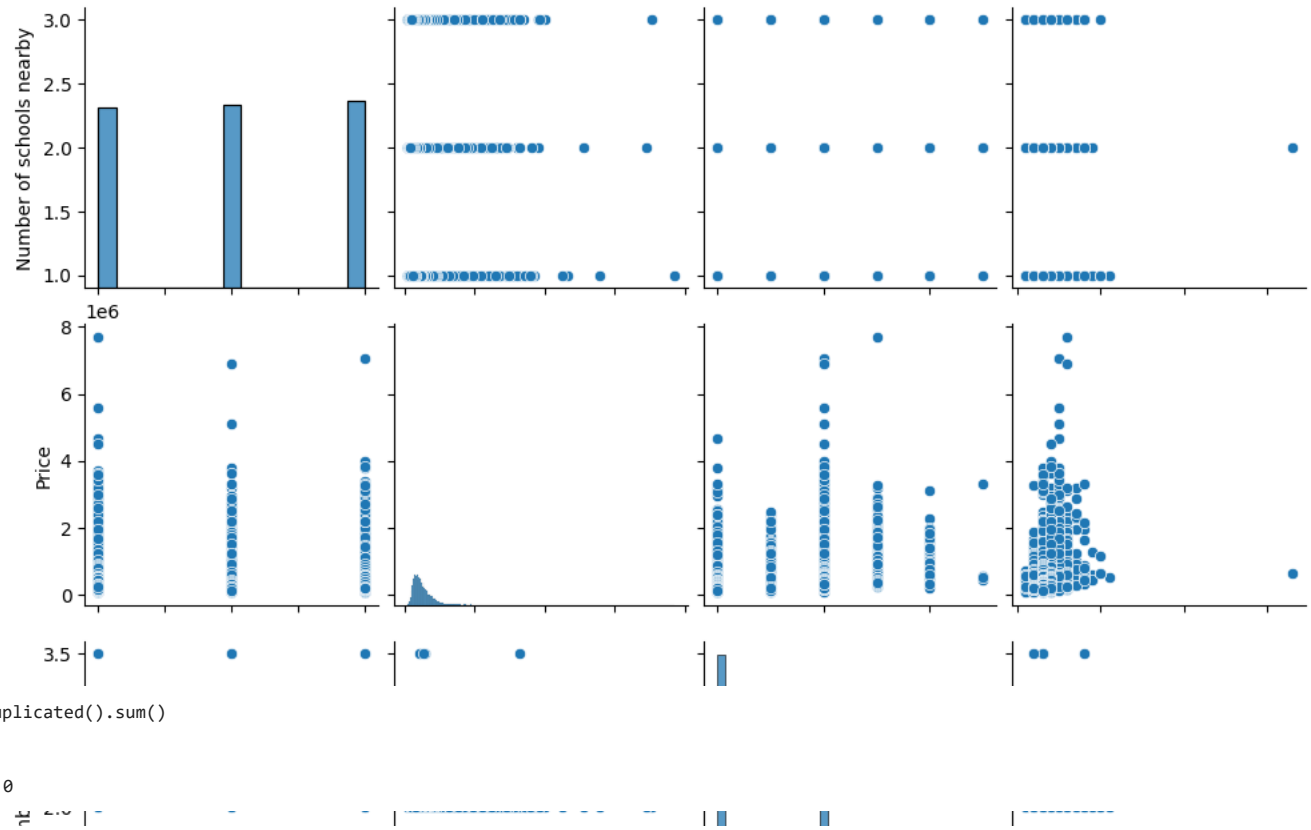

```
sns.heatmap(df[['number of floors','number of bedrooms','Price']].corr(),annot=True)
```

```
<Axes: >
```




```
sns.pairplot(df[['Number of schools nearby','Price','number of floors','number of bedrooms']])
```

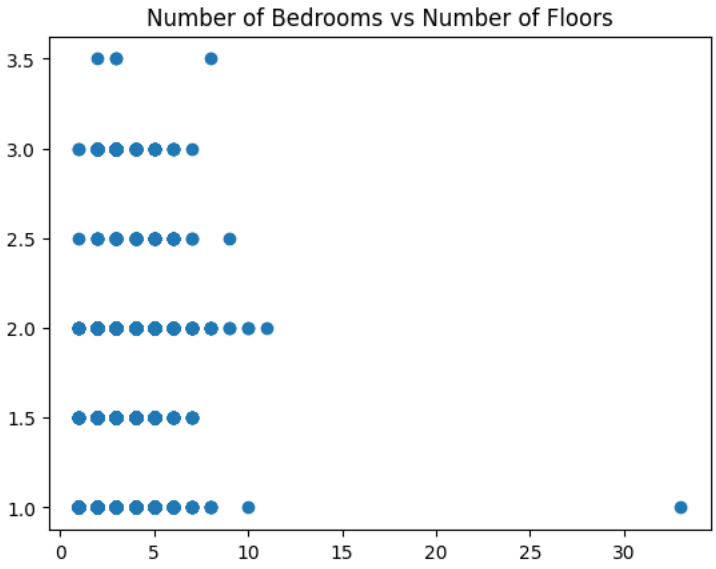
```
<seaborn.axisgrid.PairGrid at 0x7c2ae48ed0c0>
```




```
df.duplicated().sum()
```

```
0
```

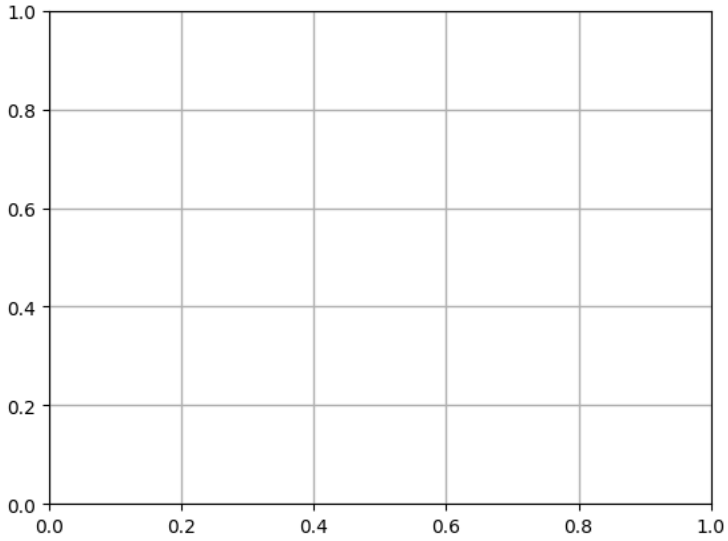
```
plt.scatter(df['number of bedrooms'],df['number of floors'])
plt.title("Number of Bedrooms vs Number of Floors")
plt.grid(linestyle='-', linewidth=0.)
```



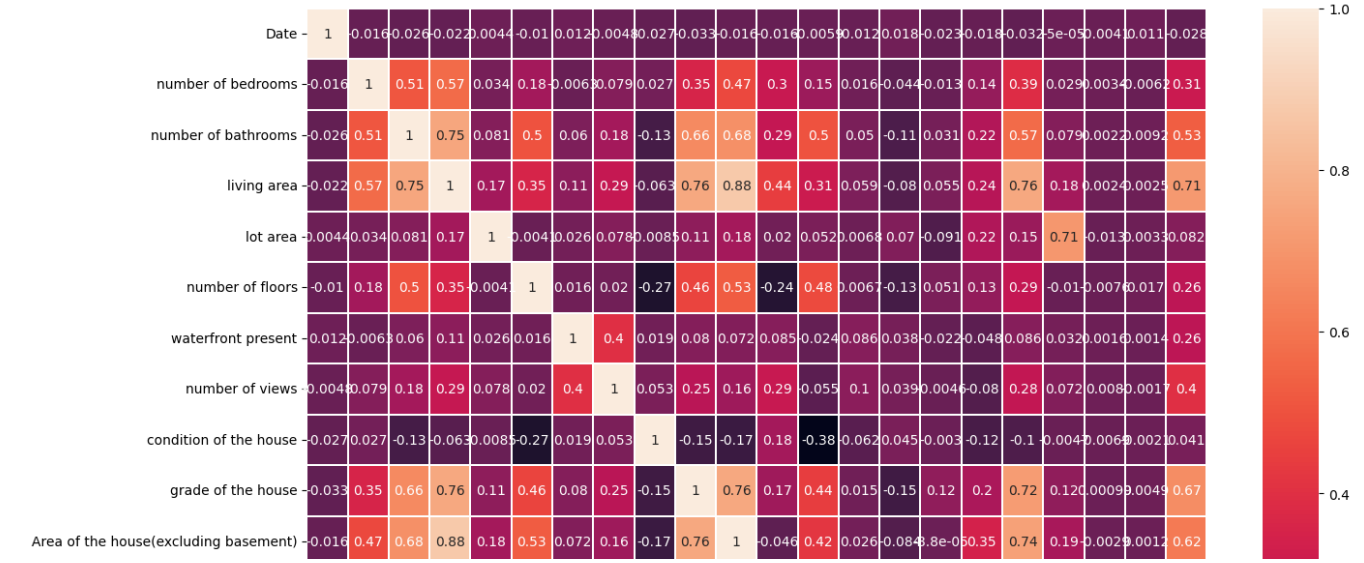

```
sns.scatterplot(df['Number of schools nearby'])
```

```
<Axes: ylabel='Number of schools nearby'>
```


```
plt.grid(linestyle='-',linewidth=1.0)
```




```
plt.subplots(figsize=(15,15))
sns.heatmap(df.drop(['id'],axis=1).corr(),linewidth=0.3,annot=True)
plt.show()
```




```
print(df.describe())
```

```
              std    6.237575e+03     67.347991            0.938719             0.769934
              min    6.762810e+09  42491.000000            1.000000             0.500000
              25%    6.762815e+09  42546.000000            3.000000             1.750000
              50%    6.762821e+09  42600.000000            3.000000             2.250000
              75%    6.762826e+09  42662.000000            4.000000             2.500000
              max    6.762832e+09  42734.000000           33.000000             8.000000

                      living area      lot area  number of floors  waterfront present  \
              count  14620.000000  1.462000e+04      14620.000000        14620.000000
              mean    2098.262996  1.509328e+04          1.502360            0.007661
              std      928.275721  3.791962e+04          0.540239            0.087193
              min      370.000000  5.200000e+02          1.000000            0.000000
              25%     1440.000000  5.010750e+03          1.000000            0.000000
              50%     1930.000000  7.620000e+03          1.500000            0.000000
              75%     2570.000000  1.080000e+04          2.000000            0.000000
              max    13540.000000  1.074218e+06          3.500000            1.000000

                     number of views  condition of the house  ...    Built Year  \
              count     14620.000000             14620.000000  ...  14620.000000
              mean          0.233105                 3.430506  ...   1970.926402
              std           0.766259                 0.664151  ...     29.493625
              min           0.000000                 1.000000  ...   1900.000000
              25%           0.000000                 3.000000  ...   1951.000000
              50%           0.000000                 3.000000  ...   1975.000000
              75%           0.000000                 4.000000  ...   1997.000000
              max           4.000000                 5.000000  ...   2015.000000

                     Renovation Year    Postal Code     Lattitude     Longitude  \
              count     14620.000000   14620.000000  14620.000000  14620.000000
              mean         90.924008  122033.062244     52.792848   -114.404007
              std         416.216661      19.082418      0.137522      0.141326
              min           0.000000  122003.000000     52.385900   -114.709000
              25%           0.000000  122017.000000     52.707600   -114.519000
              50%           0.000000  122032.000000     52.806400   -114.421000
              75%           0.000000  122048.000000     52.908900   -114.315000
              max        2015.000000  122072.000000     53.007600   -113.505000

                     living_area_renov  lot_area_renov  Number of schools nearby  \
              count       14620.000000    14620.000000              14620.000000
              mean         1996.702257    12753.500068                  2.012244
              std           691.093366    26058.414467                  0.817284
              min           460.000000      651.000000                  1.000000
              25%          1490.000000     5097.750000                  1.000000
              50%          1850.000000     7620.000000                  2.000000
              75%          2380.000000    10125.000000                  3.000000
              max          6110.000000   560617.000000                  3.000000

                     Distance from the airport         Price
              count               14620.000000  1.462000e+04
              mean                   64.950958  5.389322e+05
              std                     8.936008  3.675324e+05
              min                    50.000000  7.800000e+04
              25%                    57.000000  3.200000e+05
              50%                    65.000000  4.500000e+05
              75%                    73.000000  6.450000e+05
              max                    80.000000  7.700000e+06

              [8 rows x 23 columns]
```

```
print(df.corr())
```

```
Longitude                                      0.341221        0.258066
living_area_renov                              1.000000        0.189225
lot_area_renov                                 0.189225        1.000000
Number of schools nearby                      -0.001203       -0.025014
Distance from the airport                     -0.005673       -0.014587
Price                                          0.584924        0.075535

                                       Number of schools nearby  \
id                                                    -0.004821
Date                                                  -0.004071
number of bedrooms                                     0.003397
number of bathrooms                                    0.002180
living area                                            0.002370
lot area                                              -0.012671
number of floors                                      -0.007579
waterfront present                                     0.001563
number of views                                        0.008004
condition of the house                                -0.006939
grade of the house                                     0.000986
Area of the house(excluding basement)                 -0.002894
Area of the basement                                   0.010284
Built Year                                            -0.001631
Renovation Year                                       -0.000826
Postal Code                                            0.010605
Lattitude                                              0.014949
Longitude                                             -0.010163
living_area_renov                                     -0.001203
lot_area_renov                                        -0.025014
Number of schools nearby                               1.000000
Distance from the airport                              0.004035
Price                                                  0.009890

                                       Distance from the airport     Price
id                                                     -0.004542 -0.773114
Date                                                    0.011457 -0.027919
number of bedrooms                                     -0.006157  0.308460
number of bathrooms                                     0.009206  0.531735
living area                                             0.002511  0.712169
lot area                                                0.003291  0.081992
number of floors                                        0.016567  0.262732
waterfront present                                      0.001448  0.263687
number of views                                        -0.001657  0.395973
condition of the house                                 -0.002136  0.041376
grade of the house                                      0.004940  0.671814
Area of the house(excluding basement)                   0.001222  0.615220
Area of the basement                                    0.002926  0.330202
Built Year                                             -0.003968  0.050307
Renovation Year                                         0.005342  0.133173
Postal Code                                             0.011528 -0.115908
Lattitude                                               0.007193  0.297490
Longitude                                              -0.003100  0.024414
living_area_renov                                      -0.005673  0.584924
lot_area_renov                                         -0.014587  0.075535
Number of schools nearby                                0.004035  0.009890
Distance from the airport                               1.000000  0.003804
Price                                                   0.003804  1.000000

[23 rows x 23 columns]
```

```
print(df['number of floors'].value_counts())
```

```
1.0    7103
2.0    5666
1.5    1311
3.0     418
2.5     118
3.5       4
Name: number of floors, dtype: int64
```

```
print('Mean:',df['number of bedrooms'].mean())
print('Median:',df['number of views'].median())
print('Mode:',df['number of bathrooms'].mode())
```

```
Mean: 3.379343365253078
Median: 0.0
Mode: 0    2.5
Name: number of bathrooms, dtype: float64
```

```
print(df.isnull().sum())
```

```
id                                     0
Date                                   0
number of bedrooms                     0
number of bathrooms                    0
living area                            0
lot area                               0
number of floors                       0
```

```
waterfront present                      0
number of views                         0
condition of the house                  0
grade of the house                      0
Area of the house(excluding basement)   0
Area of the basement                    0
Built Year                              0
Renovation Year                         0
Postal Code                             0
Lattitude                               0
Longitude                               0
living_area_renov                       0
lot_area_renov                          0
Number of schools nearby                0
Distance from the airport               0
Price                                   0
dtype: int64
```

```
df.dropna(inplace=True)
df.fillna(0,inplace=True)
df.interpolate(inplace=True)
from sklearn.preprocessing import StandardScaler
from sklearn.preprocessing import MinMaxScaler
x=df.drop(['number of floors','number of bedrooms'],axis=1)
x.set_index(['Date'],inplace=True)
y=df[['id','Price']]
```

```
x.head()
```

Date	id	number of bathrooms	living area	lot area	waterfront present	number of views	condition of the house	grade of the house	Area of the house(excluding basement)	Area of the basement	Built Year	Renovation Year	Post Co
42491	6762810145	2.50	3650	9050	0	4	5	10	3370	280	1921	0	122(
42491	6762810635	2.50	2920	4000	0	0	5	8	1910	1010	1909	0	122(
42491	6762810998	2.75	2910	9480	0	0	3	8	2910	0	1939	0	122(
42491	6762812605	2.50	3310	42998	0	0	3	9	3310	0	2001	0	122(
42491	6762812919	2.00	2710	4500	0	0	4	8	1880	830	1929	0	122(

```
y.head()
```

	id	Price
0	6762810145	2380000
1	6762810635	1400000
2	6762810998	1200000
3	6762812605	838000
4	6762812919	805000

```
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestRegressor
from sklearn.ensemble import GradientBoostingRegressor
from sklearn.metrics import r2_score
```

```
x_train,x_test,y_train,y_test = train_test_split(x,y['Price'],test_size =0.1,random_state=2)
model = GradientBoostingRegressor(n_estimators=400,max_depth=5,min_samples_split=2,learning_rate=0.1)
model.fit(x_train,y_train)
```

```
GradientBoostingRegressor
GradientBoostingRegressor(max_depth=5, n_estimators=400)
```

```
y_pred = model.predict(x_test)
model.score(x_test,y_test)
```

```
0.9999939177665857
```

```
r2_score(y_pred,y_test)
```

```
0.9999939125375181
```

```
y_pred
```

```
array([467201.50782526, 244960.21568353, 250004.96234778, ...,
       667579.67630798, 230141.09447065, 208356.81611335])
```

```
y_pred_list = y['Price'][-len(y_pred):].tolist()
```

```
y_pred_df=pd.DataFrame(y_pred_list,columns=['Date'])
y_pred_df["number of floors"]= y_pred.round(2)
```

```
y_pred_df
```

	Date	number of floors
0	1100000	467201.51
1	1040000	244960.22
2	950000	250004.96
3	932990	284580.81
4	910000	485186.77
...	...	...
1457	221700	1009906.80
1458	219200	302627.98
1459	209000	667579.68
1460	205000	230141.09
1461	146000	208356.82

1462 rows × 2 columns