```
#OIBSIP Data Analytics
#Level2 taskno.:-1- Predicting House Prices with Linear Regression
#Intern name:-Sanjana Gidwani
!pip install pandas scikit-learn matplotlib seaborn
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
```

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Requirement already satisfied: pandas in /usr/local/lib/python3.12/dist-packages (2.2.2)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.12/dist-packages (1.6.1)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.12/dist-packages (3.10.0)
Requirement already satisfied: seaborn in /usr/local/lib/python3.12/dist-packages (0.13.2)
Requirement already satisfied: numpy>=1.26.0 in /usr/local/lib/python3.12/dist-packages (from pandas) (2.0.2)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.12/dist-packages (from pandas) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.12/dist-packages (from pandas) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.12/dist-packages (from pandas) (2025.2)
Requirement already satisfied: scipy>=1.6.0 in /usr/local/lib/python3.12/dist-packages (from scikit-learn) (1.16.2)
Requirement already satisfied: joblib>=1.2.0 in /usr/local/lib/python3.12/dist-packages (from scikit-learn) (1.5.2)
Requirement already satisfied: threadpoolctl>=3.1.0 in /usr/local/lib/python3.12/dist-packages (from scikit-learn) (3.6.0)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (1.3.3)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (4.60.1)
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (1.4.9)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (25.0)
Requirement already satisfied: pillow>=8 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (11.3.0)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.12/dist-packages (from matplotlib) (3.2.5)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.12/dist-packages (from python-dateutil>=2.8.2->pandas) (1.17
```

```
file_path ='/content/Housing.csv'
data = pd.read_csv(file_path)
data.head()
```

	price	area	bedrooms	bathrooms	stories	mainroad	guestroom	basement	hotwaterheating	airconditioning	parking	prefa
0	13300000	7420	4	2	3	yes	no	no	no	yes	2	
1	12250000	8960	4	4	4	yes	no	no	no	yes	3	
2	12250000	9960	3	2	2	yes	no	yes	no	no	2	
3	12215000	7500	4	2	2	yes	no	yes	no	yes	3	
4	11410000	7420	4	1	2	yes	yes	yes	no	yes	2	

```
data.shape
```

```
(545, 13)
```

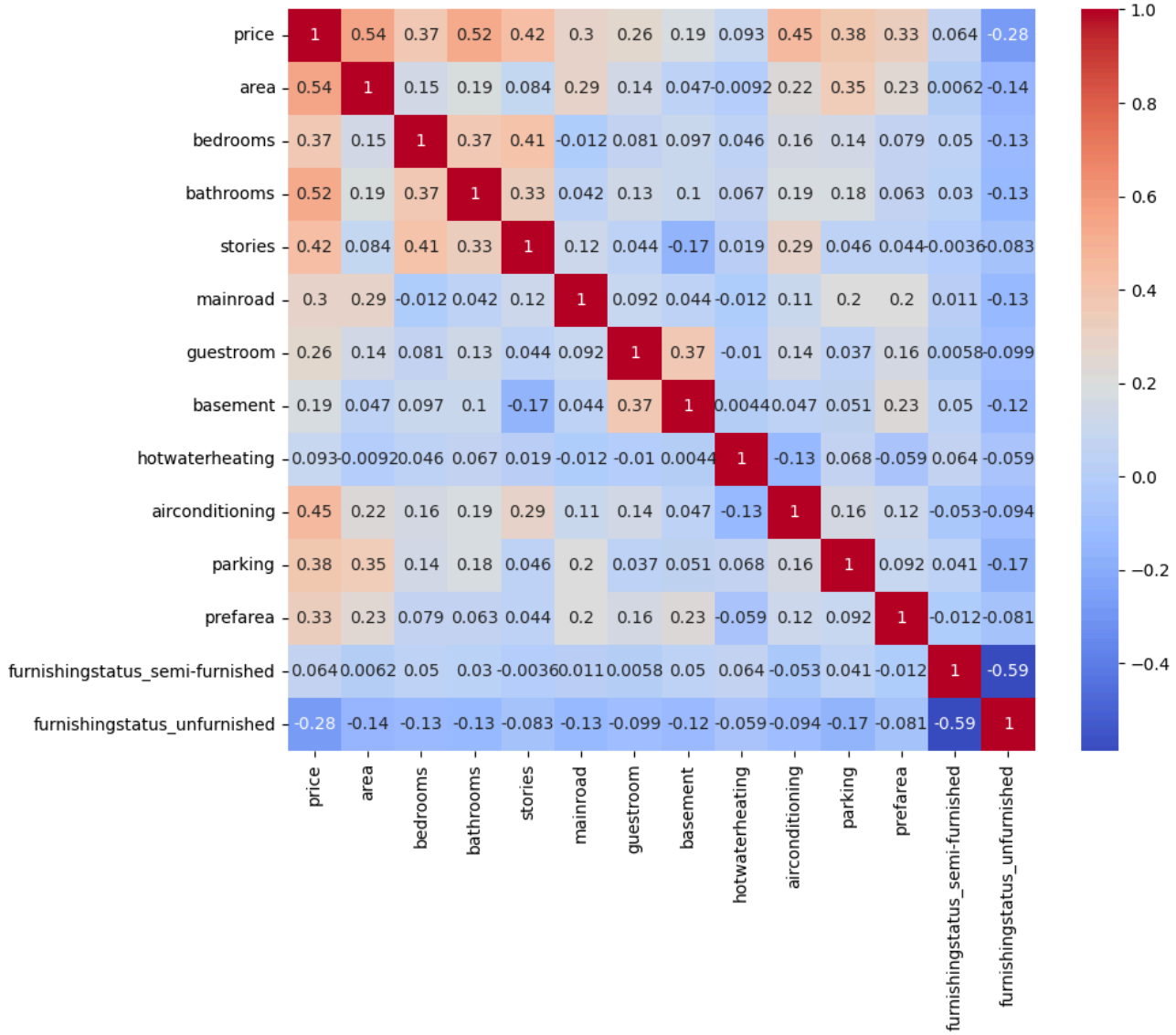
```
data.info()
data.describe()
data['mainroad']=data['mainroad'].map({'yes':1,'no':0})
data['guestroom']=data['guestroom'].map({'yes':1,'no':0})
data['basement']=data['basement'].map({'yes':1,'no':0})
data['hotwaterheating']=data['hotwaterheating'].map({'yes':1,'no':0})
data['airconditioning']=data['airconditioning'].map({'yes':1,'no':0})
data['prefarea']=data['prefarea'].map({'yes':1,'no':0})
data = pd.get_dummies(data,columns=['furnishingstatus'], drop_first=True)
data.isnull().sum()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 545 entries, 0 to 544
Data columns (total 13 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   price             545 non-null    int64 
 1   area              545 non-null    int64 
 2   bedrooms          545 non-null    int64 
 3   bathrooms         545 non-null    int64 
 4   stories           545 non-null    int64 
 5   mainroad          545 non-null    object
 6   guestroom         545 non-null    object
 7   basement          545 non-null    object
 8   hotwaterheating   545 non-null    object
 9   airconditioning   545 non-null    object
 10  parking           545 non-null    int64 
 11  prefarea          545 non-null    object
 12  furnishingstatus  545 non-null    object
dtypes: int64(6), object(7)
memory usage: 55.5+ KB
```

	0
price	0
area	0
bedrooms	0
bathrooms	0
stories	0
mainroad	0
guestroom	0
basement	0
hotwaterheating	0
airconditioning	0
parking	0
prefarea	0
furnishingstatus_semi-furnished	0
furnishingstatus_unfurnished	0

dtype: int64

```
X=data.drop('price',axis=1)
y=data['price']
plt.figure(figsize=(10,8))
sns.heatmap(data.corr(),annot=True,cmap='coolwarm')
plt.show()
```




```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
print("Shape of X_train:", X_train.shape)
print("Shape of X_test:", X_test.shape)
print("Shape of y_train:", y_train.shape)
print("Shape of y_test:", y_test.shape)
```

```
Shape of X_train: (436, 13)
Shape of X_test: (109, 13)
Shape of y_train: (436,)
Shape of y_test: (109,)
```

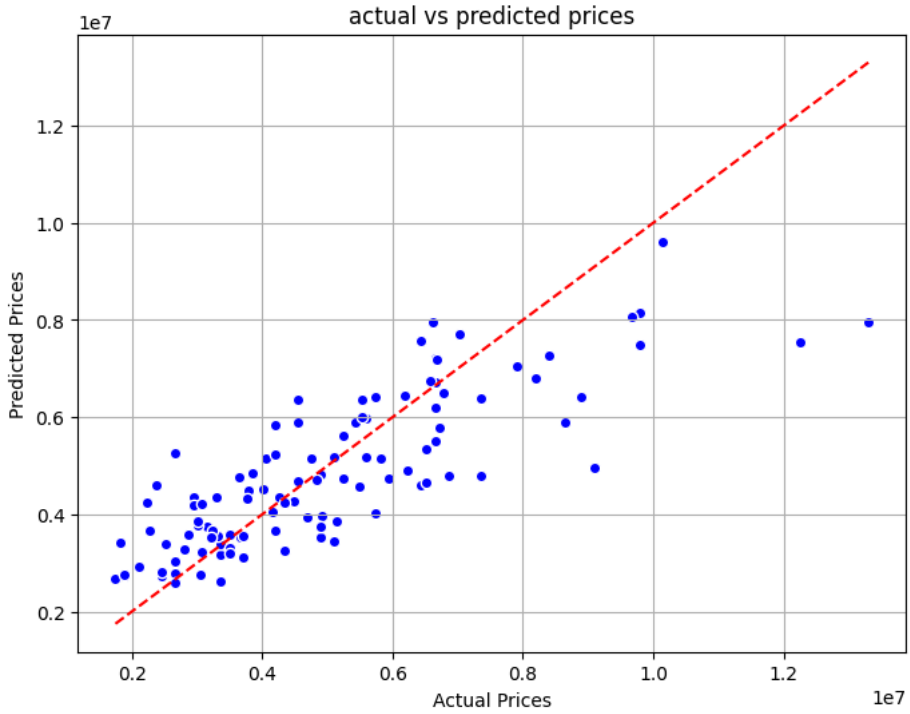
```
model= LinearRegression()
model.fit(X_train,y_train)
y_pred=model.predict(X_test)
print("Model coefficients:",model.coef_)
print("Model intercept:",model.intercept_)
```

```
Model coefficients: [ 2.35968805e+02  7.67787016e+04  1.09444479e+06  4.07476595e+05
  3.67919948e+05  2.31610037e+05  3.90251176e+05  6.84649885e+05
  7.91426736e+05  2.24841913e+05  6.29890565e+05 -1.26881818e+05
 -4.13645062e+05]
Model intercept: 260032.35760741122
```

```
mse=mean_squared_error(y_test,y_pred)
rmse=np.sqrt(mse)
r2=r2_score(y_test,y_pred)
print("Mean Squared Error:",mse)
print("Root Mean Squared Error:",rmse)
print("R-squared:",r2)
```

```
Mean Squared Error: 1754318687330.6633
Root Mean Squared Error: 1324506.9600914384
R-squared: 0.6529242642153185
```

```
#comparing actual vs predicted prices
plt.figure(figsize=(8,6))
plt.scatter(y_test,y_pred,color='blue',label='Actual vs Predicted',edgecolors='w')
plt.plot([min(y_test),max(y_test)],[min(y_test),max(y_test)],color='red',linestyle='--',label='Perfect Prediction')
plt.title('actual vs predicted prices')
plt.xlabel('Actual Prices')
plt.ylabel('Predicted Prices')
plt.grid(True)
plt.show()
```




```
!pip install statsmodels
```

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Requirement already satisfied: statsmodels in /usr/local/lib/python3.12/dist-packages (0.14.5)
Requirement already satisfied: numpy<3,>=1.22.3 in /usr/local/lib/python3.12/dist-packages (from statsmodels) (2.0.2)
Requirement already satisfied: scipy!=1.9.2,>=1.8 in /usr/local/lib/python3.12/dist-packages (from statsmodels) (1.16.2)
Requirement already satisfied: pandas!=2.1.0,>=1.4 in /usr/local/lib/python3.12/dist-packages (from statsmodels) (2.2.2)
Requirement already satisfied: patsy>=0.5.6 in /usr/local/lib/python3.12/dist-packages (from statsmodels) (1.0.1)
Requirement already satisfied: packaging>=21.3 in /usr/local/lib/python3.12/dist-packages (from statsmodels) (25.0)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.12/dist-packages (from pandas!=2.1.0,>=1.4->sta
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Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.12/dist-packages (from pandas!=2.1.0,>=1.4->statsmodels
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.12/dist-packages (from python-dateutil>=2.8.2->pandas!=2.1.0,
```

```
plt.figure(figsize=(8,6))
sns.residplot(x=y_test,y=y_pred,lowess=True,color='blue',line_kws={'color':'red','lw':1,'alpha':0.8})
plt.title('Residual Plot')
plt.xlabel('Fitted Values')
plt.ylabel('Residuals')
plt.show()
```