Importing Libraries And Dataset

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

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_absolute_error, mean_squared_error, r2_score
```

```
df = pd.read_csv("/content/Housing.csv")
df.head(10)
```

	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	
5	10850000	7500	3	3	1	yes	no	yes	no	yes	2	
6	10150000	8580	4	3	4	yes	no	no	no	yes	2	
7	10150000	16200	5	3	2	yes	no	no	no	no	0	
8	9870000	8100	4	1	2	yes	yes	yes	no	yes	2	
9	9800000	5750	3	2	4	yes	yes	no	no	yes	1	

Next steps: Generate code with df New interactive sheet

Preprocessing Dataset

```
df.describe()
```

	price	area	bedrooms	bathrooms	stories	parking
count	5.450000e+02	545.000000	545.000000	545.000000	545.000000	545.000000
mean	4.766729e+06	5150.541284	2.965138	1.286239	1.805505	0.693578
std	1.870440e+06	2170.141023	0.738064	0.502470	0.867492	0.861586
min	1.750000e+06	1650.000000	1.000000	1.000000	1.000000	0.000000
25%	3.430000e+06	3600.000000	2.000000	1.000000	1.000000	0.000000
50%	4.340000e+06	4600.000000	3.000000	1.000000	2.000000	0.000000
75%	5.740000e+06	6360.000000	3.000000	2.000000	2.000000	1.000000
max	1.330000e+07	16200.000000	6.000000	4.000000	4.000000	3.000000

```
df.info()
```

```
<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
```

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

	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	0

dtype: int64

```
df_enc = pd.get_dummies(df, drop_first=True)
df_enc.head()
```

	price	area	bedrooms	bathrooms	stories	parking	mainroad_yes	guestroom_yes	basement_yes	hotwaterheating_yes	aircond
0	13300000	7420	4	2	3	2	True	False	False	False	
1	12250000	8960	4	4	4	3	True	False	False	False	
2	12250000	9960	3	2	2	2	True	False	True	False	
3	12215000	7500	4	2	2	3	True	False	True	False	
4	11410000	7420	4	1	2	2	True	True	True	False	

Next steps: Generate code with df_enc New interactive sheet

```
Q1 = df_enc[['area', 'price']].quantile(0.25)
Q3 = df_enc[['area', 'price']].quantile(0.75)

IQR = Q3 - Q1

lower_bound = Q1 - 1.5 * IQR
upper_bound = Q3 + 1.5 * IQR

df_no_outliers = df_enc[
    (df_enc['area'] >= lower_bound['area']) & (df_enc['area'] <= upper_bound['area']) &
    (df_enc['price'] >= lower_bound['price']) & (df_enc['price'] <= upper_bound['price'])
]

print(f"Before removing outliers: {df_enc.shape[0]} rows")
print(f"After removing outliers: {df_no_outliers.shape[0]} rows")
```

```
Before removing outliers: 545 rows
After removing outliers: 520 rows
```

Splitting Data Into Test-Train Sets

```
X = df_no_outliers[['area']]

y = df_no_outliers['price']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
print("Train shape:", X_train.shape)
print("Test shape:", X_test.shape)
```

```
Train shape: (416, 1)
Test shape: (104, 1)
```

Fitting A Linear Regression Model

```
model = LinearRegression()
model.fit(X_train, y_train)

y_pred = model.predict(X_test)
```

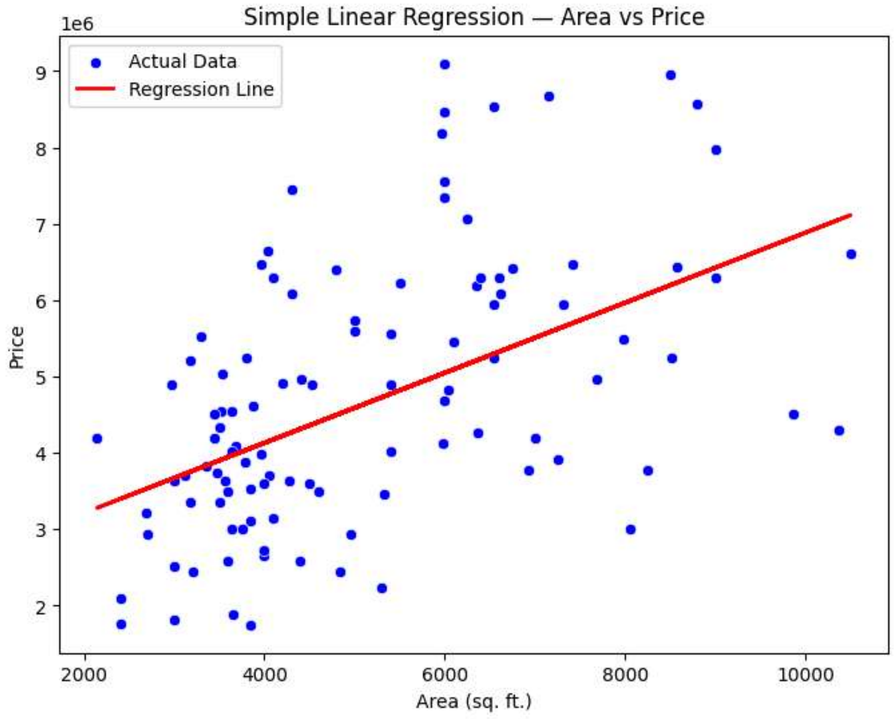
Evaluating Model Using MAE, MSE, R2

```
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

print("📊 Model Evaluation:")
print(f"Mean Absolute Error (MAE): {mae:.2f}")
print(f"Mean Squared Error (MSE): {mse:.2f}")
print(f"R² Score: {r2:.3f}")
```

```
📊 Model Evaluation:
Mean Absolute Error (MAE): 1208074.12
Mean Squared Error (MSE): 2279660501775.07
R² Score: 0.268
```

Plotting Regression Line

```
plt.figure(figsize=(8,6))
sns.scatterplot(x=X_test['area'], y=y_test, color='blue', label='Actual Data')
plt.plot(X_test['area'], y_pred, color='red', linewidth=2, label='Regression Line')

plt.title("Simple Linear Regression — Area vs Price")
plt.xlabel("Area (sq. ft.)")
plt.ylabel("Price")
plt.legend()
plt.show()
```



```
print(f"Intercept (b₀): {model.intercept_:.2f}")
print(f"Coefficient (b₁): {model.coef_[0]:.2f}")
print(f"Equation: price = {model.intercept_:.2f} + {model.coef_[0]:.2f} × area")
```

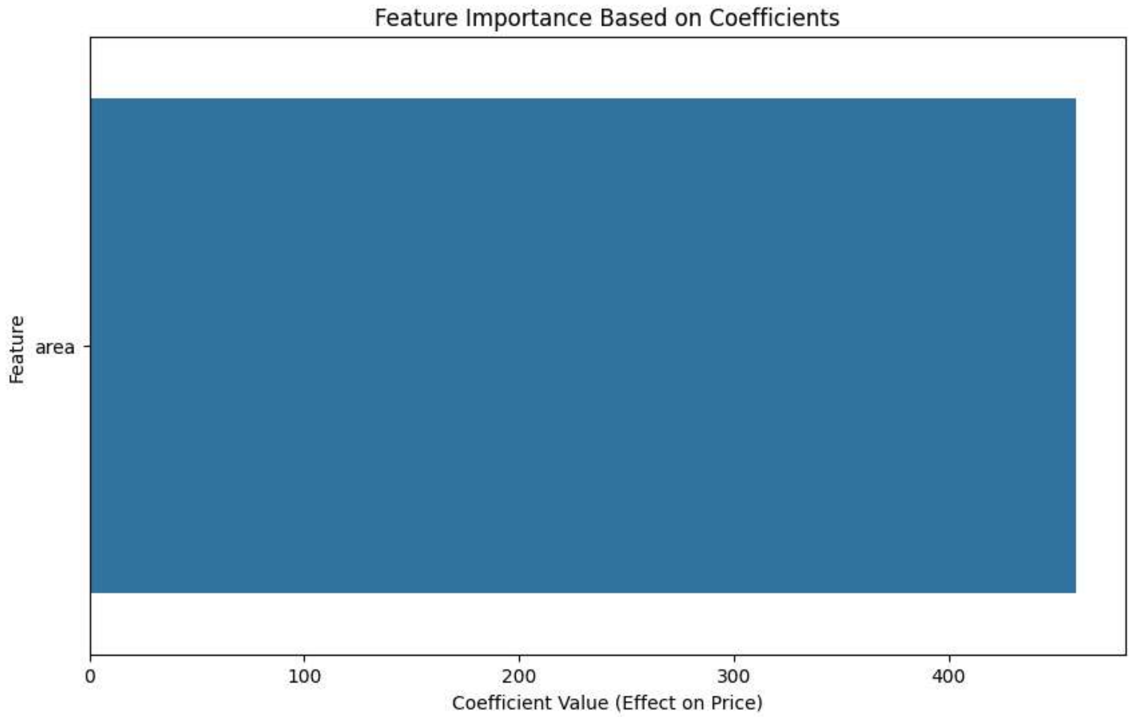
```
Intercept (b₀): 2295301.04
Coefficient (b₁): 458.96
Equation: price = 2295301.04 + 458.96 × area
```

Interpreting Coefficients

```
coef_df = pd.DataFrame({
    'Feature': X.columns,
    'Coefficient': model.coef_
}).sort_values(by='Coefficient', ascending=False)

print("Feature Coefficients (Impact on Price):")
display(coef_df)

plt.figure(figsize=(10,6))
sns.barplot(x='Coefficient', y='Feature', data=coef_df)
plt.title("Feature Importance Based on Coefficients")
plt.xlabel("Coefficient Value (Effect on Price)")
plt.ylabel("Feature")
plt.show()
```

```
Feature Coefficients (Impact on Price):
```

	Feature	Coefficient
0	area	458.960348


Feature Importance Based on Coefficients
Feature
area
Coefficient Value (Effect on Price)