In [1]:
```
import pandas as pd
import seaborn as sns
from sklearn.linear_model import LinearRegression
# import warnings
# warnings.filterwarnings('ignore')
```

In [2]:
```
#load the data into dataframe

df= pd.read_csv("homeprices.csv")
df
```

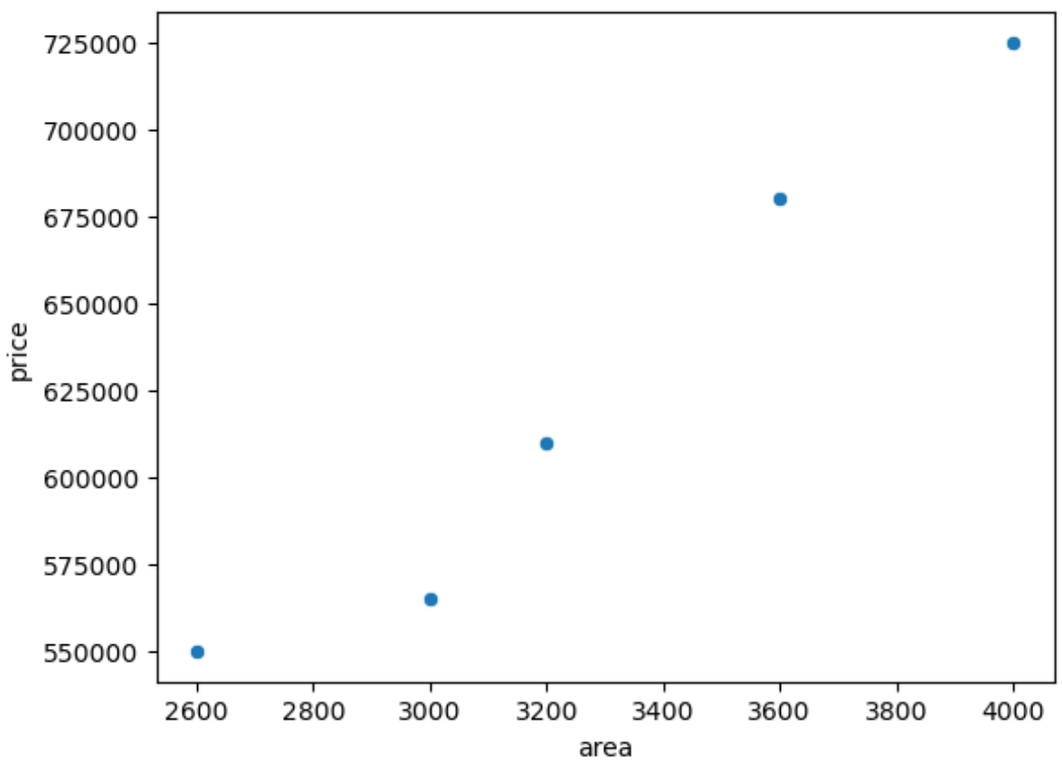
Out[2]:

| | area | price |
|---|---|---|
| **0** | 2600 | 550000 |
| **1** | 3000 | 565000 |
| **2** | 3200 | 610000 |
| **3** | 3600 | 680000 |
| **4** | 4000 | 725000 |

**Let us draw a scatter plot to see the relationship between the area and the price values. This can be done using the scatterplot() function of the seaborn module -**

In [3]:
```
#plot a scatter plot
sns.scatterplot(data=df, x='area', y='price')
```

Out[3]:
```
<Axes: xlabel='area', ylabel='price'>
```




**We can understand by observing the dots in the scatter plot that they can be connected more or less using a straight line. Hence we can apply a Simple Linear Regression ML model on this. We make this model available to us in the form of a 'reg' object. We can now call any methods od the LinearRegression class usinf this object 'reg'.**

**Now the next step is to train the ML model, by calling 'fit()' method on the data -**

***reg.fit(x,y)***

Here, 'x' indicates independent variable i.e df.area. This should be supplied in the form of 2D array to the fit() method. 'y' indicates the dependent variable, i.e - df.price.

Now the question is - How to convert the df.area column data into a 2D array ? Well there are 2 ways - the first way is to convert the df.area column into an array by using values attribute as -

***df.area.values #gives 1D array***

Now convert the 1D into a 2D array by using reshape() method of numpy arrays as -

In [4]:
```
reg = LinearRegression()
df.area.values #gives 1D array
```

Out[4]:
```
array([2600, 3000, 3200, 3600, 4000])
```

In [5]:
```
df.area.values.reshape(-1,1)
```

Out[5]:
```
array([[2600],
       [3000],
       [3200],
       [3600],
       [4000]])
```

In [6]:
```
#Another way of converting the df.area value into a 2D array is to take
reg.fit(df[['area']], df.price) #fitting means training
```

Out[6]:
```
LinearRegression()
```

**Fitting means the model has been trained with data, which means that the model tried to fit the data in the form of a straight line. This indicates that there is a linear relationship existing between the 'area' and 'price' columns.**

**Now let us test it with a data that is not there in the dataset -**

In [7]:
```
#predict the price of a 3500 sqft house
reg.predict([[3500]])
```

Out[7]:
```
array([655873.28767123])
```

In [8]:
```
#find the coefficient, this is slope m
reg.coef_
```

Out[8]:
```
array([135.78767123])
```

In [9]:
```
#find the intercept, this is b
reg.intercept_
```

Out[9]:
```
180616.43835616432
```

In [10]:
```
# if we substitute m and b values in y=mx+b,
# we get the predicted value as above

y=135.78767123*3500 + 180616.43835616432
y
```

Out[10]:
```
655873.2876611643
```

***Trying for another value - for 5000 sqft area***

In [11]:
```
reg.predict([[5000]])
```

Out[11]:
```
array([859554.79452055])
```

## Finding the accuracy level of the model by finding r squared values

In [12]:
```
from sklearn.metrics import r2_score

y_original = df.price
y_predicted = reg.predict(df[['area']])

R_square = r2_score(y_original, y_predicted)
print('r squared value', R_square)
```

```
r squared value 0.9584301138199486
```

**r-squared value is 0.95843... , hence indicating a 95.8% accuracy for this model which is quite good.**

**Let us check the scatter plot with a regression line using lmplot(). lmplot() will draw the straight line that best fits the data points.**

In [13]:
```
sns.lmplot(data=df, x='area', y='price')
```

Out[13]:
```
<seaborn.axisgrid.FacetGrid at 0x7f54507b4dd0>
```