In [1]:
```
# This model is using Linear Regression to predict house price based on the ac
cessibility to the nearest MRT station.

#installing python libraries.

import pandas as pd
import numpy as np
import seaborn as sns
%matplotlib inline
```

In [2]:
```
pwd
```

Out[2]:
```
'C:\\Users\\rehnu'
```

In [3]:
```
cd C:\Users\rehnu\OneDrive\Desktop\Python!\Datasets for Kaggle Projects
```

```
C:\Users\rehnu\OneDrive\Desktop\Python!\Datasets for Kaggle Projects
```

In [4]:
```
Housing_data = pd.read_excel("Real_estate_valuation_data set.xlsx")
```

In [5]:
```
#Showing first few rows of data.
Housing_data.head()
```

Out[5]:

	No	X1 transaction date	X2 house age	X3 distance to the nearest MRT station	X4 number of convenience stores	X5 latitude	X6 longitude	Y house price of unit area
0	1	2012.916667	32.0	84.87882	10	24.98298	121.54024	37.9
1	2	2012.916667	19.5	306.59470	9	24.98034	121.53951	42.2
2	3	2013.583333	13.3	561.98450	5	24.98746	121.54391	47.3
3	4	2013.500000	13.3	561.98450	5	24.98746	121.54391	54.8
4	5	2012.833333	5.0	390.56840	5	24.97937	121.54245	43.1

In [6]:
```
#showing last few rows of data.
Housing_data.tail()
```

Out[6]:

	No	X1 transaction date	X2 house age	X3 distance to the nearest MRT station	X4 number of convenience stores	X5 latitude	X6 longitude	Y house price of unit area
409	410	2013.000000	13.7	4082.01500	0	24.94155	121.50381	15.4
410	411	2012.666667	5.6	90.45606	9	24.97433	121.54310	50.0
411	412	2013.250000	18.8	390.96960	7	24.97923	121.53986	40.6
412	413	2013.000000	8.1	104.81010	5	24.96674	121.54067	52.5
413	414	2013.500000	6.5	90.45606	9	24.97433	121.54310	63.9

In [7]:
```
#Checking any null values.
Housing_data.isnull().sum()
```

Out[7]:
```
No                                        0
X1 transaction date                       0
X2 house age                              0
X3 distance to the nearest MRT station    0
X4 number of convenience stores           0
X5 latitude                               0
X6 longitude                              0
Y house price of unit area                0
dtype: int64
```

In [8]:
```
#Showing data types of all columns.
Housing_data.info()
```

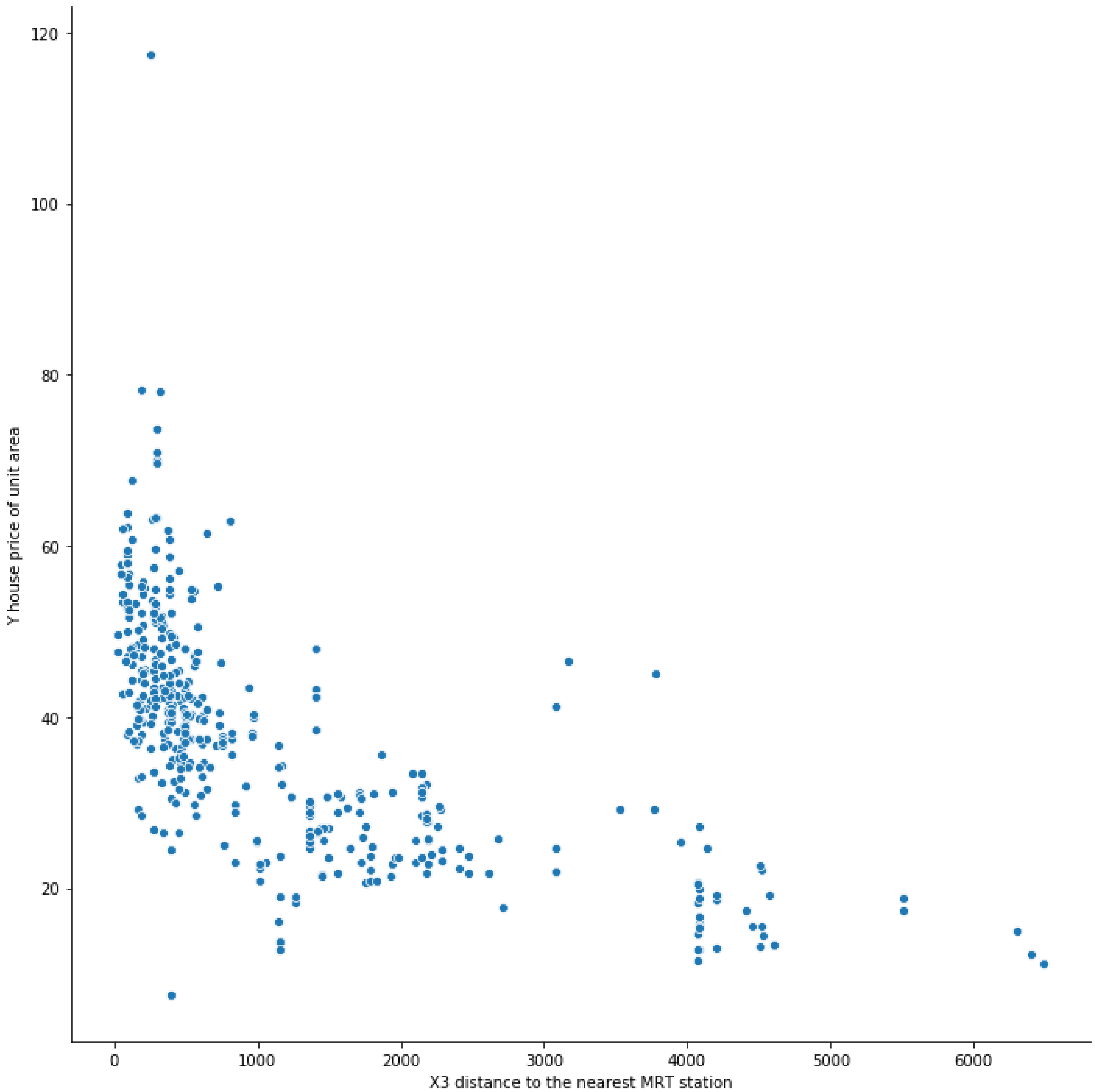
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 414 entries, 0 to 413
Data columns (total 8 columns):
No                                        414 non-null int64
X1 transaction date                       414 non-null float64
X2 house age                              414 non-null float64
X3 distance to the nearest MRT station    414 non-null float64
X4 number of convenience stores           414 non-null int64
X5 latitude                               414 non-null float64
X6 longitude                              414 non-null float64
Y house price of unit area                414 non-null float64
dtypes: float64(6), int64(2)
memory usage: 26.0 KB
```

In [9]:
```
#Showing the total number of rows and columns in the dataset.
Housing_data.shape
```

Out[9]:
```
(414, 8)
```

In [10]:
```
#Showing the scatter plot of "distance to the nearest MRT station" vs "house p
rice".

sns.pairplot(Housing_data, x_vars = ['X3 distance to the nearest MRT station'
], y_vars = ['Y house price of unit area'], height = 10, aspect = 1.0, kind =
'scatter')
```

Out[10]: <seaborn.axisgrid.PairGrid at 0x1b7dcef8088>



In [11]:
```
#Declaring the independent variable.

X = Housing_data['X3 distance to the nearest MRT station']
X.head()
```

Out[11]:
```
0     84.87882
1    306.59470
2    561.98450
3    561.98450
4    390.56840
Name: X3 distance to the nearest MRT station, dtype: float64
```

In [12]:
```
#Declaring the dependent variable.

Y = Housing_data['Y house price of unit area']
Y.head()
```

Out[12]:
```
0    37.9
1    42.2
2    47.3
3    54.8
4    43.1
Name: Y house price of unit area, dtype: float64
```

In [13]:
```
#Splitting the dataset into train and test.

from sklearn.model_selection import train_test_split
X_train, X_test, Y_train, Y_test = train_test_split(X,Y, train_size = 0.7, ran
dom_state = 100)
```

In [14]:
```
#Showing the train data.

print(X_train.shape)
```

```
(289,)
```

In [15]:
```
#Fixing the column issues in the train and test dataset as previously they sho
wed only the number of rows.


import numpy as np

X_train = X_train[:, np.newaxis]
X_test = X_test[:, np.newaxis]
```

In [16]:
```
print(X_train.shape)
```

```
(289, 1)
```

In [17]:
```
#Fixing linear regression model.

from sklearn.linear_model import LinearRegression

lr = LinearRegression()

lr.fit (X_train, Y_train)
```

Out[17]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=None, normalize=Fals
e)
```

In [18]:
```
#Printing the intercept and slope of the linear regression model.

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

```
45.825776046478694
[-0.00714734]
```

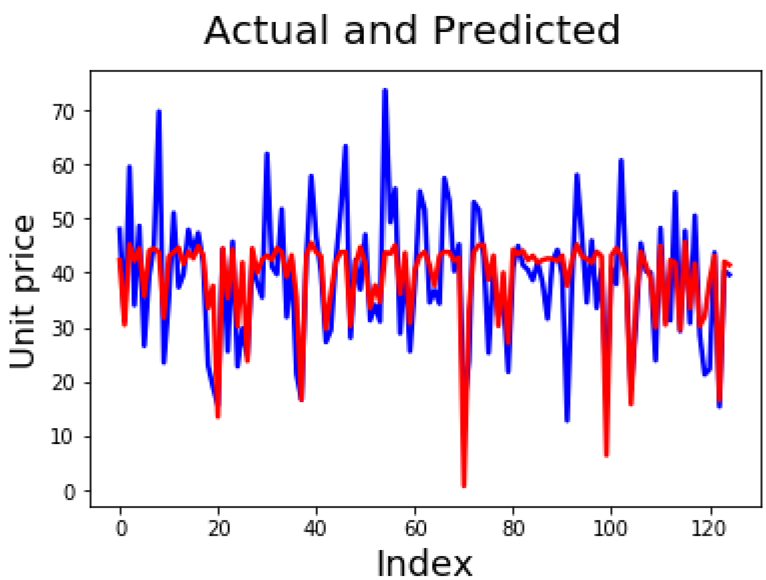
In [19]:
```
#Declaring a prediction variable to test the model.

Y_pred = lr.predict(X_test)
```

In [20]:
```
#Showing prediction and test variable size.

print(Y_pred.shape)
print(Y_test.shape)
```

```
(125,)
(125,)
```

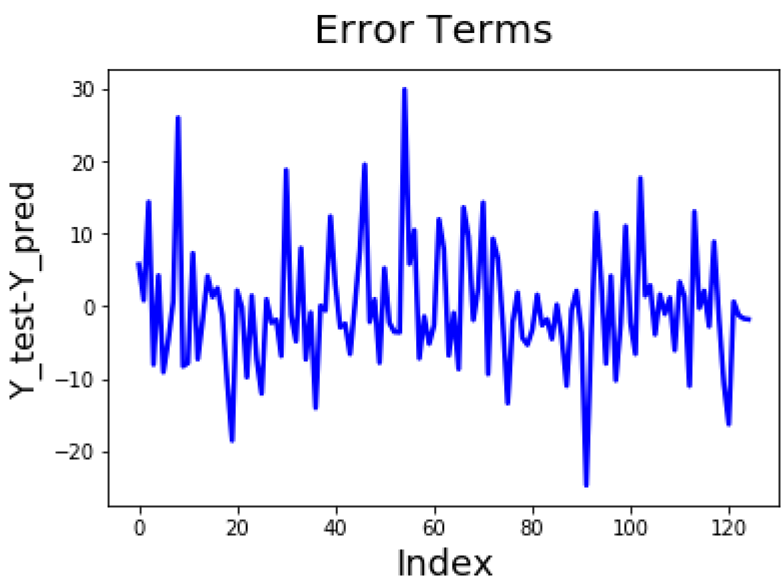
In [21]:
```
#Showing comparison between actual and predicted values.

import matplotlib.pyplot as plt
c = [i for i in range (0,125,1)]
fig=plt.figure()
plt.plot(c,Y_test, color="blue", linewidth=2.5, linestyle="-")
plt.plot(c,Y_pred, color="red", linewidth=2.5, linestyle="-")
fig.suptitle('Actual and Predicted', fontsize=20)
plt.xlabel('Index', fontsize=18)
plt.ylabel('Unit price',fontsize=16)
```

Out[21]: Text(0, 0.5, 'Unit price')



In [22]:
```
#Showing the residual plot.

c = [i for i in range (0,125,1)]
fig=plt.figure()
plt.plot(c,Y_test-Y_pred, color="blue", linewidth=2.5, linestyle="-")
fig.suptitle('Error Terms', fontsize=20)
plt.xlabel('Index', fontsize=18)
plt.ylabel('Y_test-Y_pred',fontsize=16)
```

Out[22]:
```
Text(0, 0.5, 'Y_test-Y_pred')
```



In [23]:
```
#Calculating mean squared error.

from sklearn.metrics import mean_squared_error, r2_score
mse = mean_squared_error (Y_test, Y_pred)
```

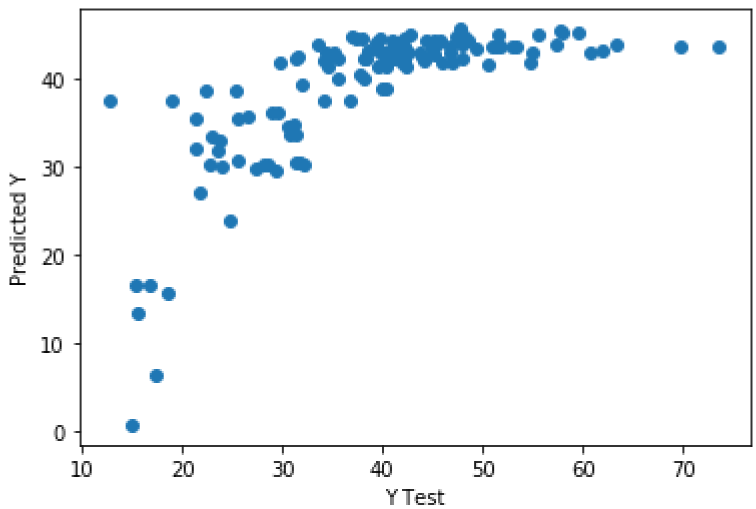
In [24]:
```
#Calculating the R-squared value.

r_squared=r2_score (Y_test, Y_pred)
```

In [25]:
```
print('Mean_Squared_Error :', mse)
print('r_squared_value :',r_squared)
```

```
Mean_Squared_Error : 68.6178057851028
r_squared_value : 0.5104359968219091
```

In [26]:
```
#Showing scatter plot of actual and predicted values.

import matplotlib.pyplot as plt
plt.scatter(Y_test, Y_pred)
plt.xlabel('Y Test')
plt.ylabel('Predicted Y')
```

Out[26]: Text(0, 0.5, 'Predicted Y')



In [27]:
```
# The Simple Linear Regression exercise has an R-squared value of 0.51 and Mea
n Squared Error of 68.61, which indicate that the replationship between
# the two variables do not have a very strong Linear relationship. That is why
the actual and prdicted house unit price differed so
# much from each other. A non-linear regression model could be tried in this c
ase to come up with a better model.
```

In [ ]: