EXPERIMENT- 3

AIM

Create various types of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further, lable different axes in a plot and data in a plot.

SOFTWARE USED

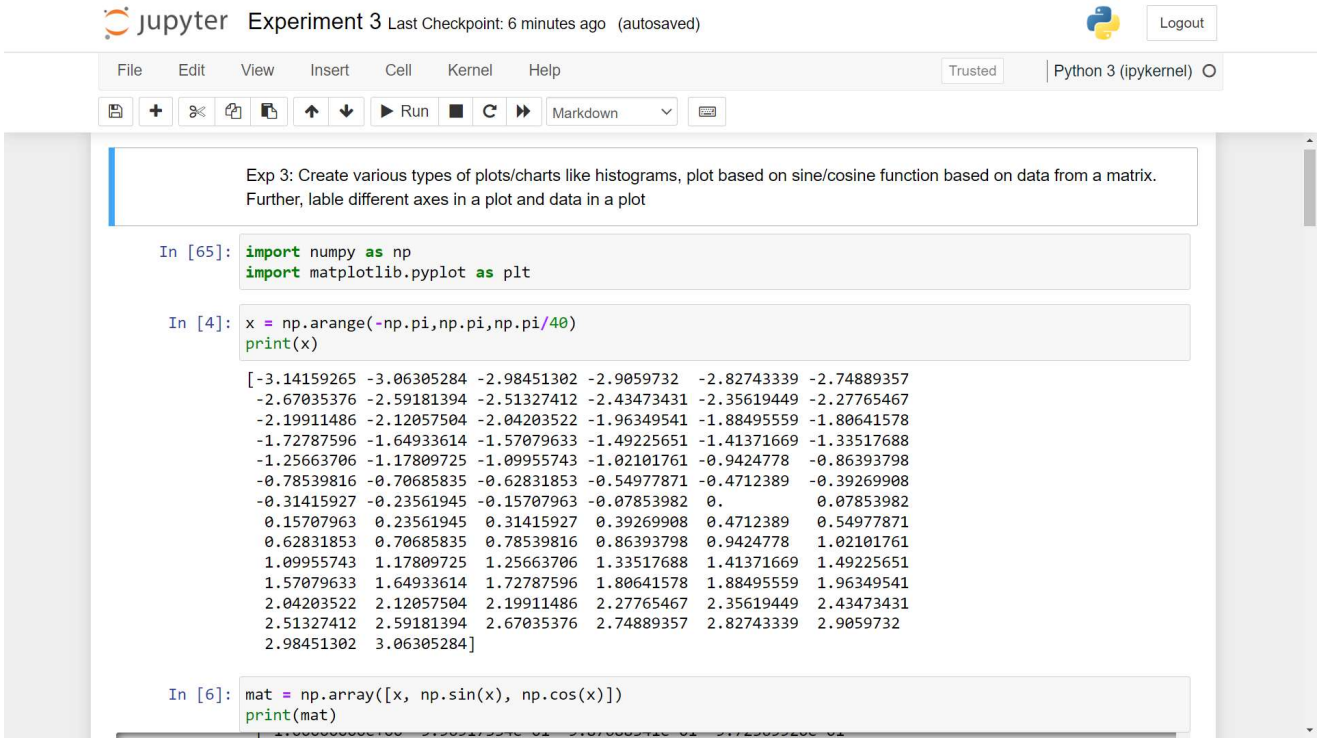
Jupyter Platform - Python Programming Language

PROGRAM CODE

```
# Exp 3: Create various types of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further, label different axes in a plot and data in a plot

import numpy as np
import matplotlib.pyplot as plt
import numpy as np

x = np.arange(-np.pi,np.pi,np.pi/40)
print(x)

mat = np.array([x, np.sin(x), np.cos(x)])
print(mat)

plt.plot(mat[0],mat[1], label="sin(x)")
plt.plot(mat[0],mat[2], label="cos(x)")

#Line Plot
plt.title("Line plot on Trigonometric Functions",fontsize='20')
plt.xlabel("Values of x"+r"$\rightarrow$")
plt.ylabel("Function values"+r"$\rightarrow$")
plt.axhline(y=0, color = "black")
plt.axvline(x=0, color = "black")
plt.legend()
plt.grid()

#Scatter Plot
plt.scatter(mat[0],mat[1], label="sin(x)")
plt.scatter(mat[0],mat[2], label="cos(x)")

plt.title("Scatter Plot on Trigonometric Functions",fontsize='20')
plt.xlabel("Values of x"+r"$\rightarrow$")
plt.ylabel("Function values"+r"$\rightarrow$")
plt.axhline(y=0, color = "black")
plt.axvline(x=0, color = "black")
plt.legend()
plt.grid()

#Box Plot
plt.boxplot([mat[0],mat[1],mat[2]], labels = ['x','sin(x)','cos(x)'])
plt.title("Box Plot",fontsize='20')
plt.xlabel("X"+r"$\rightarrow$")
```

```
plt.ylabel("Y"+r"$\rightarrow$")
plt.grid()


a = np.array(["A", "B", "C", "D"])
b = np.array([3, 8, 1, 10])
print(a)
print(b)

#Bar Graph
plt.bar(a,b, color='red')
plt.title('Bar Graph',fontsize='20')
plt.xlabel("Product Name"+r"$\rightarrow$")
plt.ylabel("Quantity"+r"$\rightarrow$")
plt.grid()

#Pie Chart
plt.figure(figsize=(6,6))
plt.pie(b, labels=a, autopct = "%1.1f%%",wedgeprops={'linewidth': 3.0, 'edgecolor': 'black'})
plt.title("Pie Chart",fontsize='20')

#Histogram
plt.hist(np.random.normal(23,19,22), color='green')
plt.title("Histogram",fontsize='20')
plt.xlabel("X"+r"$\rightarrow$")
plt.ylabel("Y"+r"$\rightarrow$")
plt.grid()
```

OUTPUT



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Run Markdown

In [6]:
```
mat = np.array([x, np.sin(x), np.cos(x)])
print(mat)
```

```
 -9.51056516e-01 -9.23879533e-01 -8.91006524e-01 -8.52640164e-01
 -8.09016994e-01 -7.60405966e-01 -7.07106781e-01 -6.49448048e-01
 -5.87785252e-01 -5.22498565e-01 -4.53990500e-01 -3.82683432e-01
 -3.09016994e-01 -2.33445364e-01 -1.56434465e-01 -7.84590957e-02
  6.12323400e-17  7.84590957e-02  1.56434465e-01  2.33445364e-01
  3.09016994e-01  3.82683432e-01  4.53990500e-01  5.22498565e-01
  5.87785252e-01  6.49448048e-01  7.07106781e-01  7.60405966e-01
  8.09016994e-01  8.52640164e-01  8.91006524e-01  9.23879533e-01
  9.51056516e-01  9.72369920e-01  9.87688341e-01  9.96917334e-01
  1.00000000e+00  9.96917334e-01  9.87688341e-01  9.72369920e-01
  9.51056516e-01  9.23879533e-01  8.91006524e-01  8.52640164e-01
  8.09016994e-01  7.60405966e-01  7.07106781e-01  6.49448048e-01
  5.87785252e-01  5.22498565e-01  4.53990500e-01  3.82683432e-01
  3.09016994e-01  2.33445364e-01  1.56434465e-01  7.84590957e-02
  6.12323400e-17 -7.84590957e-02 -1.56434465e-01 -2.33445364e-01
 -3.09016994e-01 -3.82683432e-01 -4.53990500e-01 -5.22498565e-01
 -5.87785252e-01 -6.49448048e-01 -7.07106781e-01 -7.60405966e-01
 -8.09016994e-01 -8.52640164e-01 -8.91006524e-01 -9.23879533e-01
 -9.51056516e-01 -9.72369920e-01 -9.87688341e-01 -9.96917334e-01]]
```

In [68]:
```
plt.plot(mat[0],mat[1], label="sin(x)")
plt.plot(mat[0],mat[2], label="cos(x)")

plt.title("Line plot on Trigonometric Functions",fontsize='20')
plt.xlabel("Values of x"+r"$\rightarrow$")
```

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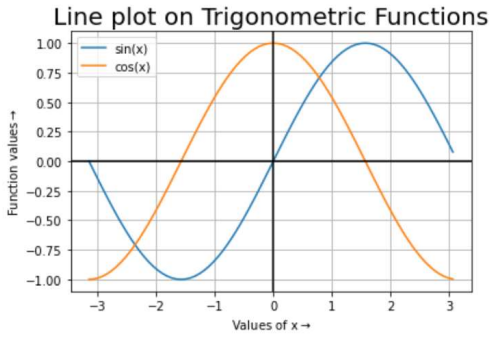
Run Markdown

In [68]:
```
plt.plot(mat[0],mat[1], label="sin(x)")
plt.plot(mat[0],mat[2], label="cos(x)")

plt.title("Line plot on Trigonometric Functions",fontsize='20')
plt.xlabel("Values of x"+r"$\rightarrow$")
plt.ylabel("Function values"+r"$\rightarrow$")
plt.axhline(y=0, color = "black")
plt.axvline(x=0, color = "black")
plt.legend()
plt.grid()
```



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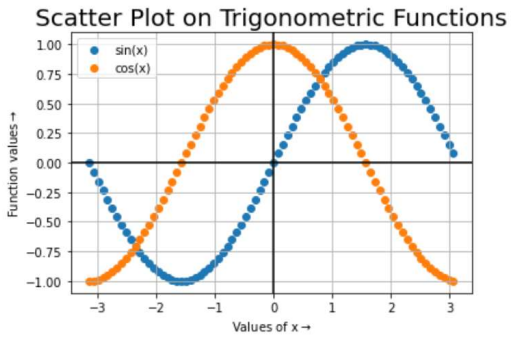
Run Markdown

In [86]:
```
plt.scatter(mat[0],mat[1], label="sin(x)")
plt.scatter(mat[0],mat[2], label="cos(x)")

plt.title("Scatter Plot on Trigonometric Functions",fontsize='20')
plt.xlabel("Values of x"+r"$\rightarrow$")
plt.ylabel("Function values"+r"$\rightarrow$")
plt.axhline(y=0, color = "black")
plt.axvline(x=0, color = "black")
plt.legend()
plt.grid()
```



jupyter Experiment 3 Last Checkpoint: 7 minutes ago (autosaved)

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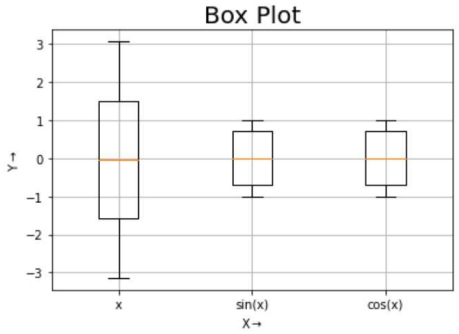
Run Markdown

In [87]:
```
plt.boxplot([mat[0],mat[1],mat[2]], labels = ['x','sin(x)','cos(x)'])
plt.title("Box Plot",fontsize='20')
plt.xlabel("X"+r"$\rightarrow$")
plt.ylabel("Y"+r"$\rightarrow$")
plt.grid()
```



In [11]:
```
a = np.array(["A", "B", "C", "D"])
b = np.array([3, 8, 1, 10])
print(a)
print(b)
```

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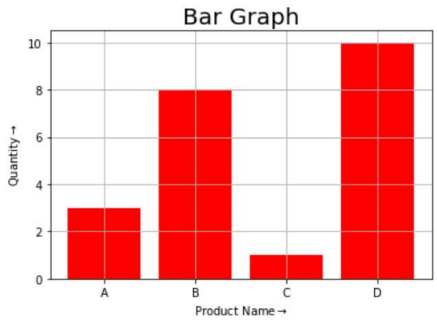
Run Markdown

In [11]:
```
a = np.array(["A", "B", "C", "D"])
b = np.array([3, 8, 1, 10])
print(a)
print(b)
```

```
['A' 'B' 'C' 'D']
[ 3  8  1 10]
```

In [67]:
```
plt.bar(a,b, color='red')
plt.title('Bar Graph',fontsize='20')
plt.xlabel("Product Name"+r"$\rightarrow$")
plt.ylabel("Quantity"+r"$\rightarrow$")
plt.grid()
```



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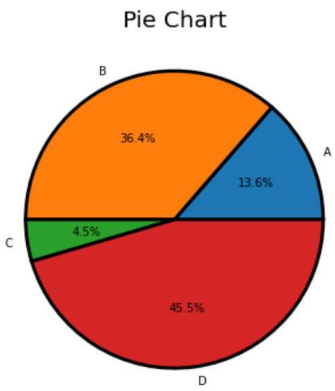
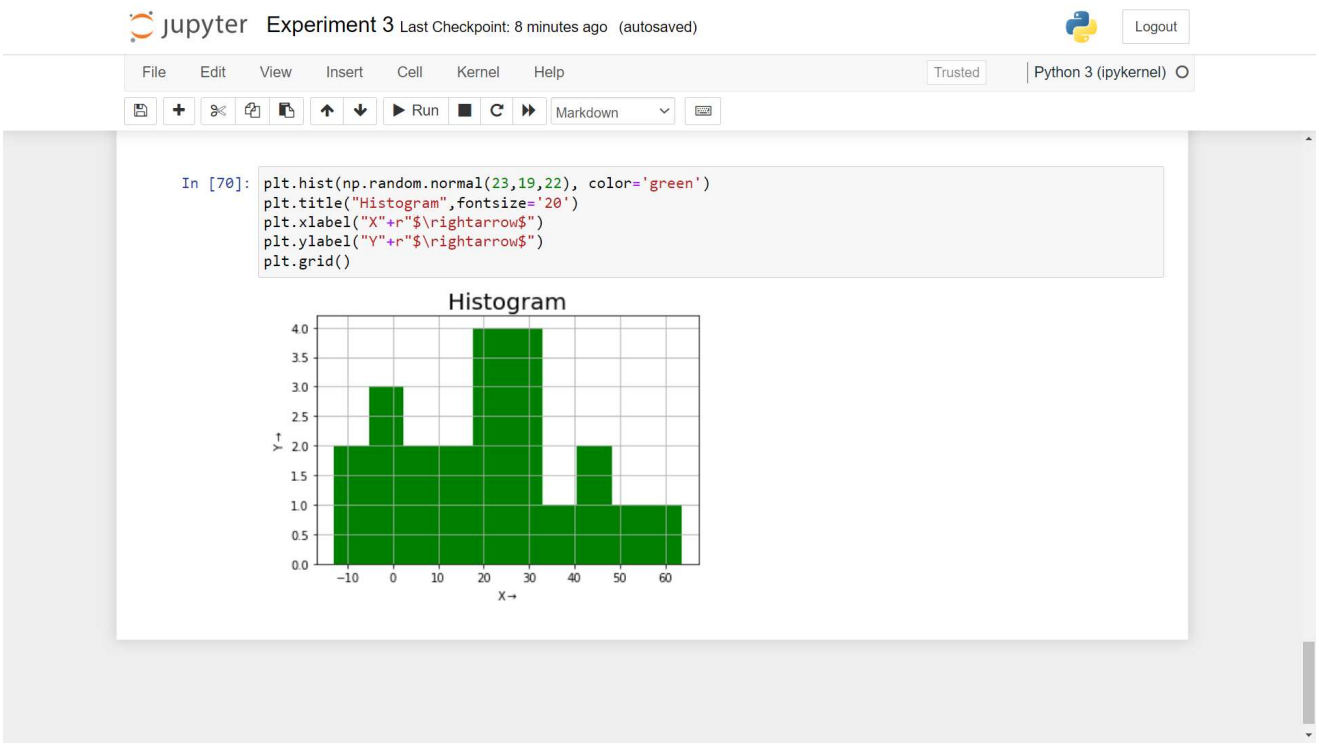
Run Markdown

In [64]:
```
plt.figure(figsize=(6,6))
plt.pie(b, labels=a, autopct = "%1.1f%%",wedgeprops={'linewidth': 3.0, 'edgecolor': 'black'})
plt.title("Pie Chart",fontsize='20')
```

Out[64]:
```
Text(0.5, 1.0, 'Pie Chart')
```



In [70]:
```
plt.hist(np.random.normal(23,19,22), color='green')
plt.title("Histogram",fontsize='20')
plt.xlabel("X"+r"$\rightarrow$")
```



DISCUSSION and CONCLUSION

The various types of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix, have been studied and created in the Jupyter platform. Further, labelling of different axes in a plot and data in a plot, have been performed.

CRITERIA	TOTAL MARKS	MARKS OBTAINED	COMMENTS
Concept (A)	2		
Implementation (B)	2		
Performance (C)	2		
Total	6		

EXPERIMENT- 4

AIM

To implement linear regression model on housing data.

SOFTWARE USED

Jupyter Platform - Python Programming Language

PROGRAM CODE

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

data = pd.read_csv("kc_house_data.csv")

data.head()
data.describe()

data['bedrooms'].value_counts().plot(kind='bar')
plt.title('number of Bedroom')
plt.xlabel('Bedrooms')
plt.ylabel('Count')
sns.despine

plt.figure(figsize=(10,10))
sns.jointplot(x=data.lat.values, y=data.long.values, height=10)
plt.ylabel('Longitude', fontsize=12)
plt.xlabel('Latitude', fontsize=12)
plt.show()
sns.despine


plt.scatter(data.price,data.sqft_living)
plt.title("Price vs Square Feet")

plt.scatter(data.price,data.long)
plt.title("Price vs Location of the area")


plt.scatter(data.price,data.lat)
plt.xlabel("Price")
plt.ylabel('Latitude')
plt.title("Latitude vs Price")
```

```
plt.scatter(data.bedrooms,data.price)
plt.title("Bedroom and Price ")
plt.xlabel("Bedrooms")
plt.ylabel("Price")
plt.show()
sns.despine

plt.scatter((data['sqft_living']+data['sqft_basement']),data['price'])

plt.scatter(data.waterfront,data.price)
plt.title("Waterfront vs Price ( 0= no waterfront)")

train1 = data.drop(['id', 'price'],axis=1)

train1.head()

data.floors.value_counts().plot(kind='bar')

plt.scatter(data.floors,data.price)

plt.scatter(data.condition,data.price)

plt.scatter(data.zipcode,data.price)
plt.title("Which is the pricey location by zipcode?")


from sklearn.linear_model import LinearRegression

reg = LinearRegression()

labels = data['price']
conv_dates = [1 if values == 2014 else 0 for values in data.date ]
data['date'] = conv_dates
train1 = data.drop(['id', 'price'],axis=1)

from sklearn.model_selection import train_test_split

x_train , x_test , y_train , y_test = train_test_split(train1 , labels , test_size = 0.10,random_state =2)

reg.fit(x_train,y_train)

reg.score(x_test,y_test)
```

OUTPUT

jupyter housesales (2) (unsaved changes)

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Run Code

In [35]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import mpl_toolkits
%matplotlib inline
```

In [36]:
```
data = pd.read_csv("kc_house_data.csv")
```

In [37]:
```
data.head()
```

Out[37]:

	id	date	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	...	grade	sqft_above	sqft_basement	yr_built
0	7129300520	20141013T000000	221900.0	3	1.00	1180	5650	1.0	0	0	...	7	1180	0	1955
1	6414100192	20141209T000000	538000.0	3	2.25	2570	7242	2.0	0	0	...	7	2170	400	1951
2	5631500400	20150225T000000	180000.0	2	1.00	770	10000	1.0	0	0	...	6	770	0	1933
3	2487200875	20141209T000000	604000.0	4	3.00	1960	5000	1.0	0	0	...	7	1050	910	1965
4	1954400510	20150218T000000	510000.0	3	2.00	1680	8080	1.0	0	0	...	8	1680	0	1987

5 rows × 21 columns

In [38]:
```
data.describe()
```

Out[38]:

	id	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition	g
count	2.161300e+04	2.161300e+04	21613.000000	21613.000000	21613.000000	2.161300e+04	21613.000000	21613.000000	21613.000000	21613.000000	21613.00
mean	4.580302e+09	5.400881e+05	3.370842	2.114757	2079.899736	1.510697e+04	1.494309	0.007542	0.234303	3.409430	7.65
std	2.876566e+09	3.671272e+05	0.930062	0.770163	918.440897	4.142051e+04	0.539989	0.086517	0.766318	0.650743	1.17
min	1.000102e+06	7.500000e+04	0.000000	0.000000	290.000000	5.200000e+02	1.000000	0.000000	0.000000	1.000000	1.00
25%	2.123049e+09	3.219500e+05	3.000000	1.750000	1427.000000	5.040000e+03	1.000000	0.000000	0.000000	3.000000	7.00
50%	3.904930e+09	4.500000e+05	3.000000	2.250000	1910.000000	7.618000e+03	1.500000	0.000000	0.000000	3.000000	7.00
75%	7.308900e+09	6.450000e+05	4.000000	2.500000	2550.000000	1.068800e+04	2.000000	0.000000	0.000000	4.000000	8.00

jupyter housesales (2) (unsaved changes)

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Run Code

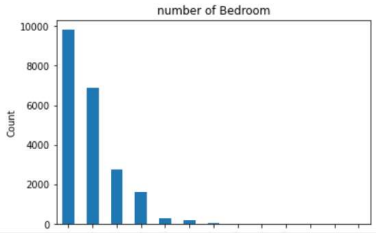
In [38]:
```
data.describe()
```

Out[38]:

	id	price	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition	g
count	2.161300e+04	2.161300e+04	21613.000000	21613.000000	21613.000000	2.161300e+04	21613.000000	21613.000000	21613.000000	21613.000000	21613.00
mean	4.580302e+09	5.400881e+05	3.370842	2.114757	2079.899736	1.510697e+04	1.494309	0.007542	0.234303	3.409430	7.65
std	2.876566e+09	3.671272e+05	0.930062	0.770163	918.440897	4.142051e+04	0.539989	0.086517	0.766318	0.650743	1.17
min	1.000102e+06	7.500000e+04	0.000000	0.000000	290.000000	5.200000e+02	1.000000	0.000000	0.000000	1.000000	1.00
25%	2.123049e+09	3.219500e+05	3.000000	1.750000	1427.000000	5.040000e+03	1.000000	0.000000	0.000000	3.000000	7.00
50%	3.904930e+09	4.500000e+05	3.000000	2.250000	1910.000000	7.618000e+03	1.500000	0.000000	0.000000	3.000000	7.00
75%	7.308900e+09	6.450000e+05	4.000000	2.500000	2550.000000	1.068800e+04	2.000000	0.000000	0.000000	4.000000	8.00
max	9.900000e+09	7.700000e+06	33.000000	8.000000	13540.000000	1.651359e+06	3.500000	1.000000	4.000000	5.000000	13.00

In [39]:
```
data['bedrooms'].value_counts().plot(kind='bar')
plt.title('number of Bedroom')
plt.xlabel('Bedrooms')
plt.ylabel('Count')
sns.despine
```

Out[39]:
```
<function seaborn.utils.despine(fig=None, ax=None, top=True, right=True, left=False, bottom=False, offset=None, trim=False)>
```



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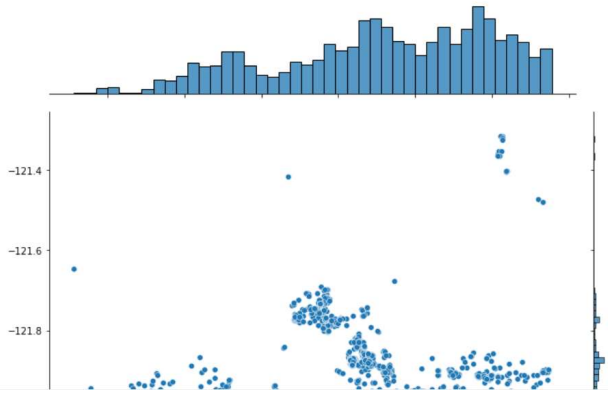
Python 3 (ipykernel)

Run Code

In [40]:
```
plt.figure(figsize=(10,10))
sns.jointplot(x=data.lat.values, y=data.long.values, height=10)
plt.ylabel('Longitude', fontsize=12)
plt.xlabel('Latitude', fontsize=12)
plt.show()

sns.despine
```

```
<Figure size 720x720 with 0 Axes>
```



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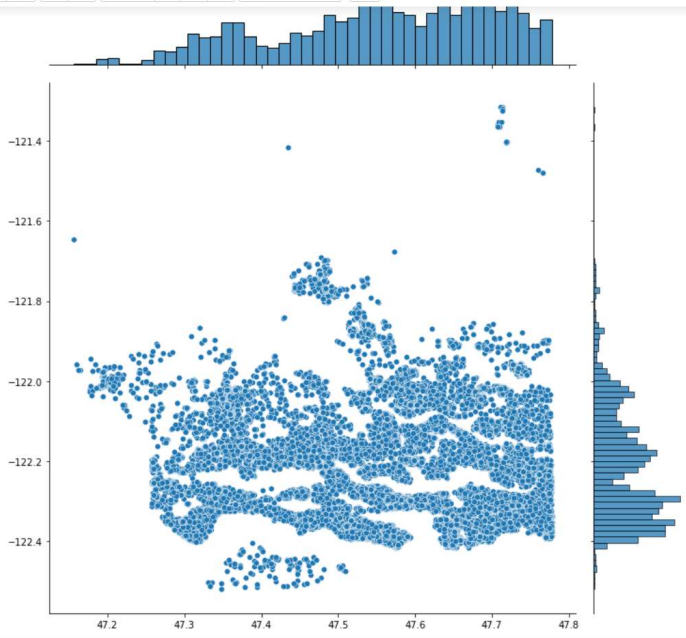
Python 3 (ipykernel)

Run Code



jupyter housesales (2) (unsaved changes)

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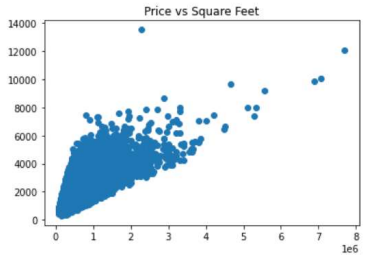
Run Code

47.2 47.3 47.4 47.5 47.6 47.7 47.8

Out[40]: <function seaborn.utils.despine(fig=None, ax=None, top=True, right=True, left=False, bottom=False, offset=None, trim=False)>

In [41]:
```
plt.scatter(data.price,data.sqft_living)
plt.title("Price vs Square Feet")
```

Out[41]: Text(0.5, 1.0, 'Price vs Square Feet')



In [42]:
```
plt.scatter(data.price,data.long)
plt.title("Price vs Location of the area")
```

Out[42]: Text(0.5, 1.0, 'Price vs Location of the area')

jupyter housesales (2) (autosaved)

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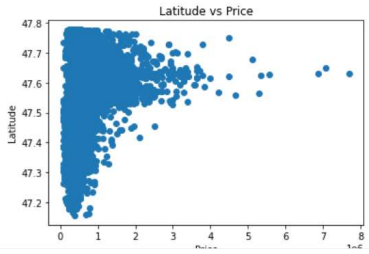
Run Code

In [43]:
```
plt.scatter(data.price,data.lat)
plt.xlabel("Price")
plt.ylabel('Latitude')
plt.title("Latitude vs Price")
```

Out[43]: Text(0.5, 1.0, 'Latitude vs Price')



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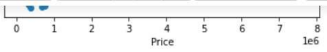
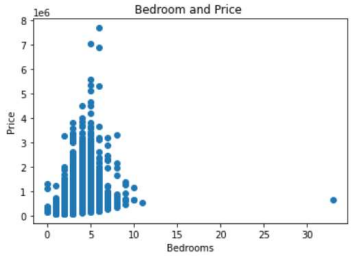
Run Code



In [44]:
```
plt.scatter(data.bedrooms,data.price)
plt.title("Bedroom and Price ")
plt.xlabel("Bedrooms")
plt.ylabel("Price")
plt.show()
sns.despine
```



Out[44]:
```
<function seaborn.utils.despine(fig=None, ax=None, top=True, right=True, left=False, bottom=False, offset=None, trim=False)>
```

In [45]:
```
plt.scatter((data['sqft_living']+data['sqft_basement']),data['price'])
```

Out[45]:
```
<matplotlib.collections.PathCollection at 0x7fcbc9c76e90>
```

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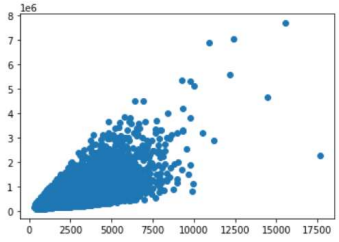
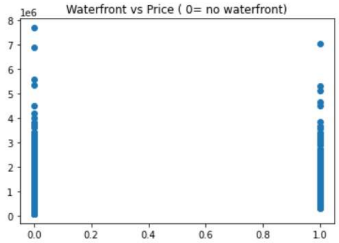
Run Code



In [46]:
```
plt.scatter(data.waterfront,data.price)
plt.title("Waterfront vs Price ( 0= no waterfront)")
```

Out[46]:
```
Text(0.5, 1.0, 'Waterfront vs Price ( 0= no waterfront)')
```



jupyter housesales (2) (autosaved)

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Run Code

In [47]:
```
train1 = data.drop(['id', 'price'],axis=1)
```

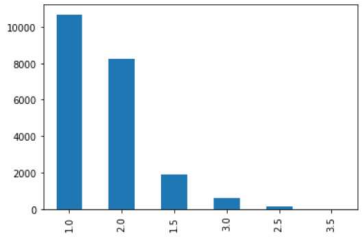
In [48]:
```
train1.head()
```

Out[48]:

	date	bedrooms	bathrooms	sqft_living	sqft_lot	floors	waterfront	view	condition	grade	sqft_above	sqft_basement	yr_built	yr_renovated
0	20141013T000000	3	1.00	1180	5650	1.0	0	0	3	7	1180	0	1955	0
1	20141209T000000	3	2.25	2570	7242	2.0	0	0	3	7	2170	400	1951	1991
2	20150225T000000	2	1.00	770	10000	1.0	0	0	3	6	770	0	1933	0
3	20141209T000000	4	3.00	1960	5000	1.0	0	0	5	7	1050	910	1965	0
4	20150218T000000	3	2.00	1680	8080	1.0	0	0	3	8	1680	0	1987	0

In [49]:
```
data.floors.value_counts().plot(kind='bar')
```

Out[49]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fcbc9ae6a50>
```



In [50]:
```
plt.scatter(data.floors,data.price)
```

jupyter housesales (2) (autosaved)

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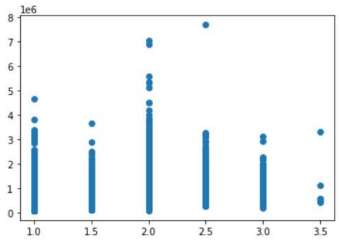
Run Code

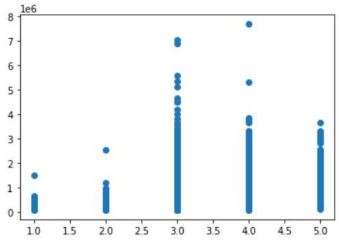
In [50]:
```
plt.scatter(data.floors,data.price)
```

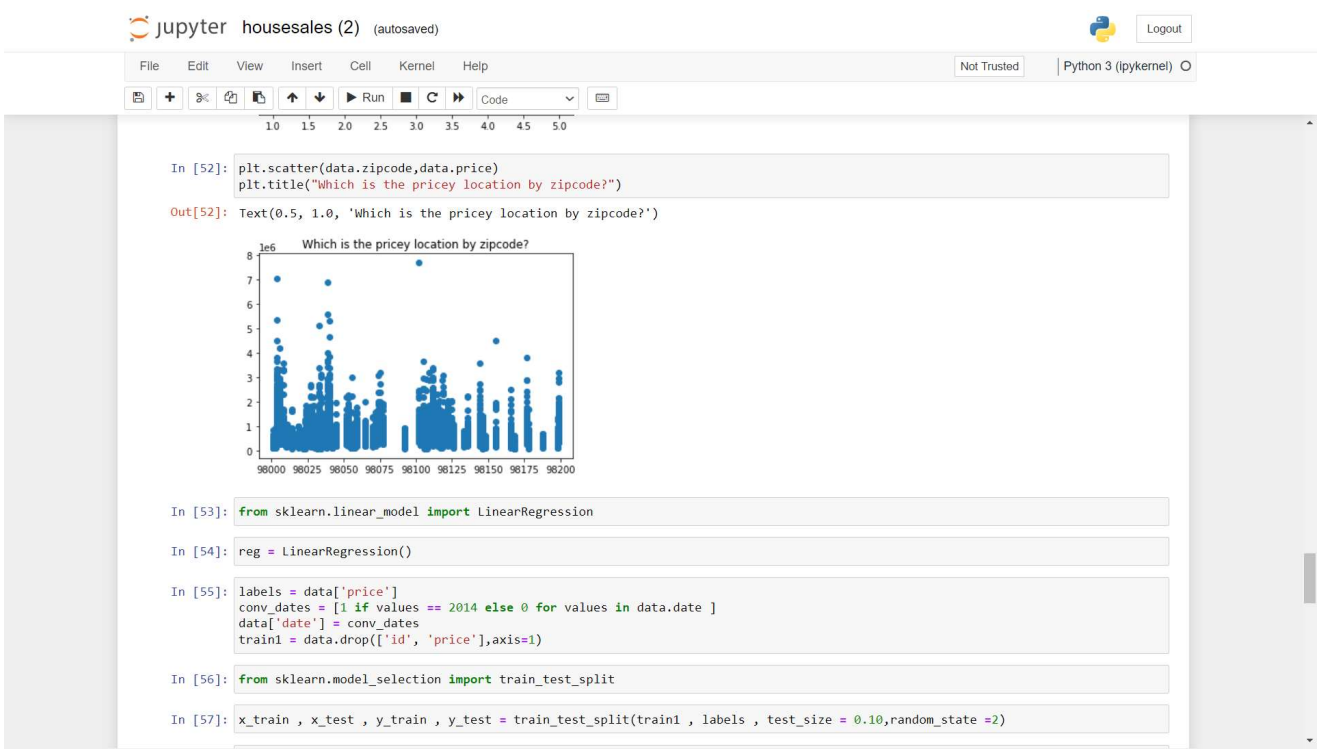
Out[50]:
```
<matplotlib.collections.PathCollection at 0x7fcbc9a185d0>
```

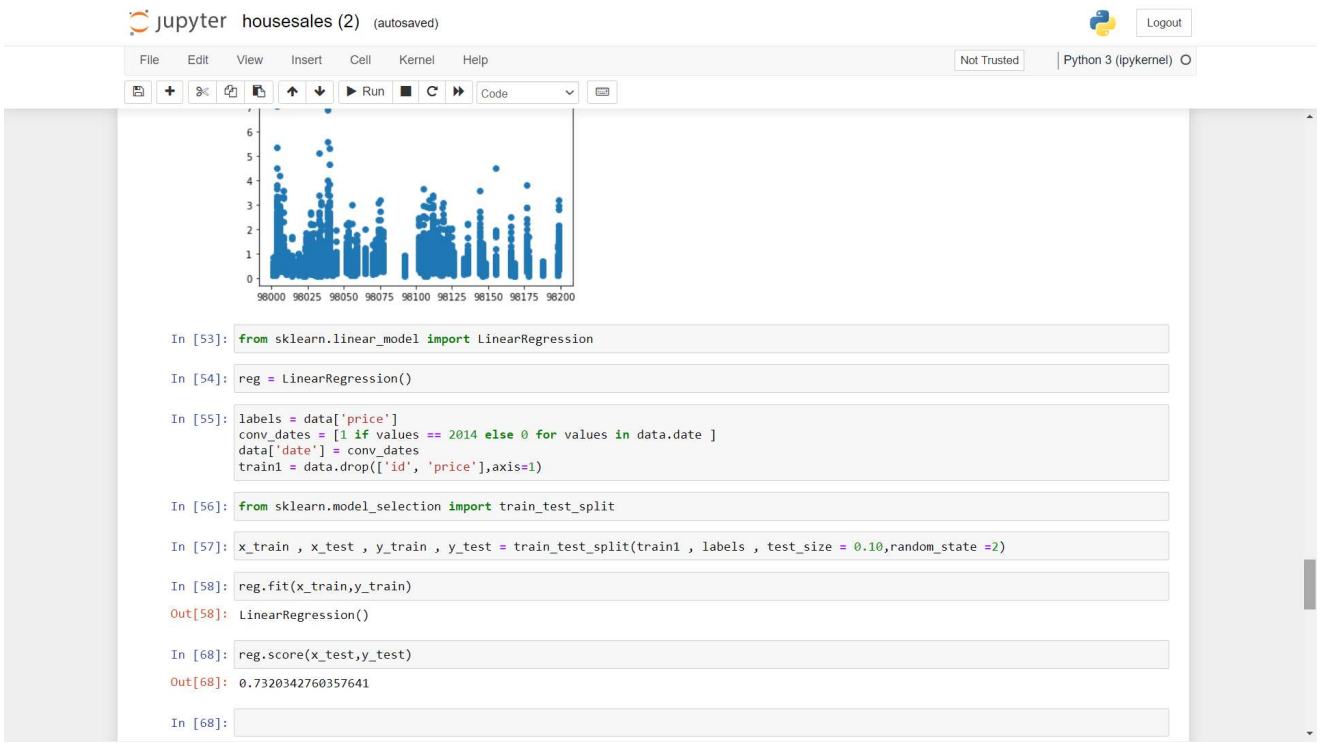


In [51]:
```
plt.scatter(data.condition,data.price)
```

Out[51]:
```
<matplotlib.collections.PathCollection at 0x7fcbc9b76a90>
```







DISCUSSION and CONCLUSION

The linear regression model has been applied and executed successfully on housing data.

CRITERIA	TOTAL MARKS	MARKS OBTAINED	COMMENTS
Concept (A)	2		
Implementation (B)	2		
Performance (C)	2		
Total	6		