In [1]:
```
#Importing Key libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:
```
#Brief
# Assumed the role of a  Performance Analyst for AirBnB platfrom that allows individua
# Over the years AirBnB has grown in popularity and become a key focus of regulations
# Hence,the assignment is to analyze Paris Listings  with a focus in pricing.
# And proide leadership with a visul summary of factors affecting pricing and whether
# impacted listings in the Paris market
```

In [3]:
```
# OBJECTIVES
# 1.Explore and profile the data to correct any uality issues
# 2.Prepare and reform the data for visuazlization
# 3.Visualize the data and give key recommendatins
```

In [4]:
```
#Importing the dataset
Listings = pd.read_csv('C:\\Users\\hp\\Desktop\\Personal Projects\\Listings.csv',encod
Listings
```

Out[4]:

	listing_id	name	host_id	host_since	host_location	host_response_time	host_respons
0	281420	Beautiful Flat in le Village Montmartre, Paris	1466919	2011-12-03	Paris, Ile-de-France, France	NaN	
1	3705183	39 mÃ□Â² Paris (Sacre CÃ□â□□ur)	10328771	2013-11-29	Paris, Ile-de-France, France	NaN	
2	4082273	Lovely apartment with Terrace, 60m2	19252768	2014-07-31	Paris, Ile-de-France, France	NaN	
3	4797344	Cosy studio (close to Eiffel tower)	10668311	2013-12-17	Paris, Ile-de-France, France	NaN	
4	4823489	Close to Eiffel Tower - Beautiful flat : 2 rooms	24837558	2014-12-14	Paris, Ile-de-France, France	NaN	
...	...	...	...	...	...	...	
279707	38338635	Appartement T2 neuf prÃ□Â¨s du tram T3a Porte ...	31161181	2015-04-13	Paris, Ile-de-France, France	NaN	
279708	38538692	Cozy Studio in Montmartre	10294858	2013-11-27	Paris, Ile-de-France, France	NaN	
279709	38683356	Nice and cosy mini-appartement in Paris	2238502	2012-04-27	Paris, Ile-de-France, France	NaN	
279710	39659000	Charming apartment near Rue Saint Maur / Oberk...	38633695	2015-07-16	Paris, Ile-de-France, France	NaN	
279711	40219504	Cosy apartment with view on Canal St Martin	6955618	2013-06-17	Paris, Ile-de-France, France	NaN	

279712 rows × 33 columns

In [5]:
```
#Reading the data
Listings
```

Out[5]:

	listing_id	name	host_id	host_since	host_location	host_response_time	host_respons
0	281420	Beautiful Flat in le Village Montmartre, Paris	1466919	2011-12-03	Paris, Ile-de-France, France	NaN	
1	3705183	39 mÃ□Â² Paris (Sacre CÃ□â□□ur)	10328771	2013-11-29	Paris, Ile-de-France, France	NaN	
2	4082273	Lovely apartment with Terrace, 60m2	19252768	2014-07-31	Paris, Ile-de-France, France	NaN	
3	4797344	Cosy studio (close to Eiffel tower)	10668311	2013-12-17	Paris, Ile-de-France, France	NaN	
4	4823489	Close to Eiffel Tower - Beautiful flat : 2 rooms	24837558	2014-12-14	Paris, Ile-de-France, France	NaN	
...	...	...	...	...	...	...	
279707	38338635	Appartement T2 neuf prÃ□Â¨s du tram T3a Porte ...	31161181	2015-04-13	Paris, Ile-de-France, France	NaN	
279708	38538692	Cozy Studio in Montmartre	10294858	2013-11-27	Paris, Ile-de-France, France	NaN	
279709	38683356	Nice and cosy mini-appartement in Paris	2238502	2012-04-27	Paris, Ile-de-France, France	NaN	
279710	39659000	Charming apartment near Rue Saint Maur / Oberk...	38633695	2015-07-16	Paris, Ile-de-France, France	NaN	
279711	40219504	Cosy apartment with view on Canal St Martin	6955618	2013-06-17	Paris, Ile-de-France, France	NaN	

279712 rows × 33 columns

In [6]:
```
#Accessing the column names
column_names = list(Listings.columns)
print(column_names)
```

```
['listing_id', 'name', 'host_id', 'host_since', 'host_location', 'host_response_tim
e', 'host_response_rate', 'host_acceptance_rate', 'host_is_superhost', 'host_total_li
stings_count', 'host_has_profile_pic', 'host_identity_verified', 'neighbourhood', 'di
strict', 'city', 'latitude', 'longitude', 'property_type', 'room_type', 'accommodate
s', 'bedrooms', 'amenities', 'price', 'minimum_nights', 'maximum_nights', 'review_sco
res_rating', 'review_scores_accuracy', 'review_scores_cleanliness', 'review_scores_ch
eckin', 'review_scores_communication', 'review_scores_location', 'review_scores_valu
e', 'instant_bookable']
```

In [7]:
```
#Subsetting the 'host_since' date column
Host_since = Listings['host_since']
Host_since
#This is for the purpose of checking the datatype of host_since column
```

Out[7]:
```
0         2011-12-03
1         2013-11-29
2         2014-07-31
3         2013-12-17
4         2014-12-14
             ...
279707    2015-04-13
279708    2013-11-27
279709    2012-04-27
279710    2015-07-16
279711    2013-06-17
Name: host_since, Length: 279712, dtype: object
```

In [8]:
```
#Changing the formart of the column type to datetime formart
Listings['host_since'] = pd.to_datetime(Listings['host_since'])
Listings['host_since']
```

Out[8]:
```
0        2011-12-03
1        2013-11-29
2        2014-07-31
3        2013-12-17
4        2014-12-14
            ...
279707   2015-04-13
279708   2013-11-27
279709   2012-04-27
279710   2015-07-16
279711   2013-06-17
Name: host_since, Length: 279712, dtype: datetime64[ns]
```

In [9]:
```
City_Listings = Listings['city'].unique()
City_Listings
#To identify the different cities in this dataset
```

Out[9]:
```
array(['Paris', 'New York', 'Bangkok', 'Rio de Janeiro', 'Sydney',
       'Istanbul', 'Rome', 'Hong Kong', 'Mexico City', 'Cape Town'],
      dtype=object)
```

In [10]:
```
Paris_Listings = Listings[Listings['city']=='Paris'][['city','host_since','neighbourhc
Paris_Listings
#To subset Paris listings only with time from when dwellers took up the space,their ne
#capacity of the space and price.
```

Out[10]:

	city	host_since	neighbourhood	accommodates	price
0	Paris	2011-12-03	Buttes-Montmartre	2	53
1	Paris	2013-11-29	Buttes-Montmartre	2	120
2	Paris	2014-07-31	Elysee	2	89
3	Paris	2013-12-17	Vaugirard	2	58
4	Paris	2014-12-14	Passy	2	60
...	...	...	...	...	...
279707	Paris	2015-04-13	Observatoire	2	120
279708	Paris	2013-11-27	Buttes-Montmartre	2	60
279709	Paris	2012-04-27	Buttes-Montmartre	2	50
279710	Paris	2015-07-16	Popincourt	2	105
279711	Paris	2013-06-17	Enclos-St-Laurent	2	70

64690 rows × 5 columns

In [11]:
```
#To check only Paris city was filtered
Only_Paris_Listings = Paris_Listings['city'].unique()
Only_Paris_Listings
```

Out[11]:
```
array(['Paris'], dtype=object)
```

In [12]:
```
#To check for missing data
Missing_data = Paris_Listings.isnull().sum()
Missing_data
```

Out[12]:
```
city              0
host_since       33
neighbourhood     0
accommodates      0
price             0
dtype: int64
```

In [13]:
```
# Droppping rows with missing values
New_Paris_Listings = Paris_Listings.dropna()
New_Paris_Listings
```

Out[13]:

	city	host_since	neighbourhood	accommodates	price
0	Paris	2011-12-03	Buttes-Montmartre	2	53
1	Paris	2013-11-29	Buttes-Montmartre	2	120
2	Paris	2014-07-31	Elysee	2	89
3	Paris	2013-12-17	Vaugirard	2	58
4	Paris	2014-12-14	Passy	2	60
...	...	...	...	...	...
279707	Paris	2015-04-13	Observatoire	2	120
279708	Paris	2013-11-27	Buttes-Montmartre	2	60
279709	Paris	2012-04-27	Buttes-Montmartre	2	50
279710	Paris	2015-07-16	Popincourt	2	105
279711	Paris	2013-06-17	Enclos-St-Laurent	2	70

64657 rows × 5 columns

In [14]:
```
New_Paris_Listings.describe()
#To obatin statistical summaries of numeric columns
```

Out[14]:

	accommodates	price
count	64657.000000	64657.000000
mean	3.037877	113.104614
std	1.588382	214.479626
min	0.000000	0.000000
25%	2.000000	59.000000
50%	2.000000	80.000000
75%	4.000000	120.000000
max	16.000000	12000.000000

In [15]:
```
Paris_listings_neighbourhood = New_Paris_Listings.groupby('neighbourhood')['price'].me
Paris_listings_neighbourhood
#To check pricing per neighbourhood,sorted from most expensive neighbourhood to the le
```

Out[15]:
```
neighbourhood
Elysee                  210.536765
Louvre                  175.379972
Passy                   161.190476
Palais-Bourbon          156.891525
Luxembourg              155.638639
Bourse                  149.496801
Hotel-de-Ville          144.515228
Temple                  138.429300
Pantheon                122.696120
Opera                   119.050713
Vaugirard               106.842073
Enclos-St-Laurent       102.988752
Batignolles-Monceau     102.615616
Observatoire            101.873591
Gobelins                 98.110184
Popincourt               90.518955
Reuilly                  89.058402
Buttes-Montmartre        87.222069
Buttes-Chaumont          82.690182
Menilmontant             74.911561
Name: price, dtype: float64
```

In [16]:
```
Paris_listings_accomodtions = New_Paris_Listings[New_Paris_Listings['neighbourhood'] =
Paris_listings_accomodtions
#To check the accomodation rates of Elysee estate-the most expensive neighbourhood
```

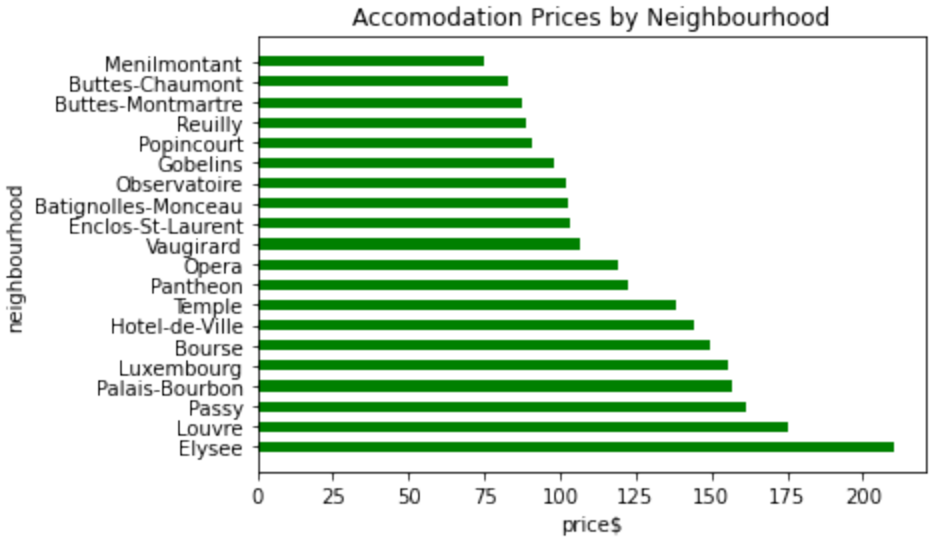
Out[16]:
```
accommodates
14    971.000000
13    842.500000
11    805.000000
16    800.000000
12    529.625000
10    500.857143
9     440.272727
7     411.538462
8     405.518519
6     355.508571
5     328.817073
4     212.096070
2     155.103352
3     152.828767
1      79.522222
0       0.000000
Name: price, dtype: float64
```

In [17]:
```
Paris_listings_overtime = New_Paris_Listings.groupby(New_Paris_Listings['host_since'].
Paris_listings_overtime
# To check the hosting trend from when AirBnB began listig in Paris
```

Out[17]:

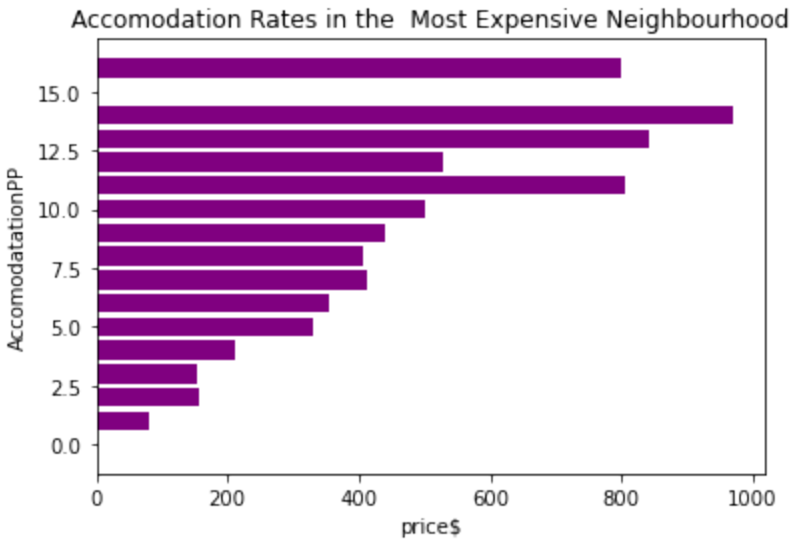
host_since	price	host_since
2008	77.750000	4
2009	159.641509	106
2010	125.031250	416
2011	124.828230	1339
2012	111.578615	4592
2013	107.096414	8142
2014	100.253800	10922
2015	103.646250	12147
2016	114.159847	8871
2017	108.658888	4585
2018	138.209362	4294
2019	129.757113	5694
2020	141.456038	3412
2021	93.488722	133

In [18]:
```
plt.barh(Paris_listings_neighbourhood.index,Paris_listings_neighbourhood.values,color
plt.title('Accomodation Prices by Neighbourhood')
plt.ylabel('neighbourhood')
plt.xlabel('price' + ('$'))
plt.show()
#A visual summary of the Accomodtaion pricing against neighbourhoods
```

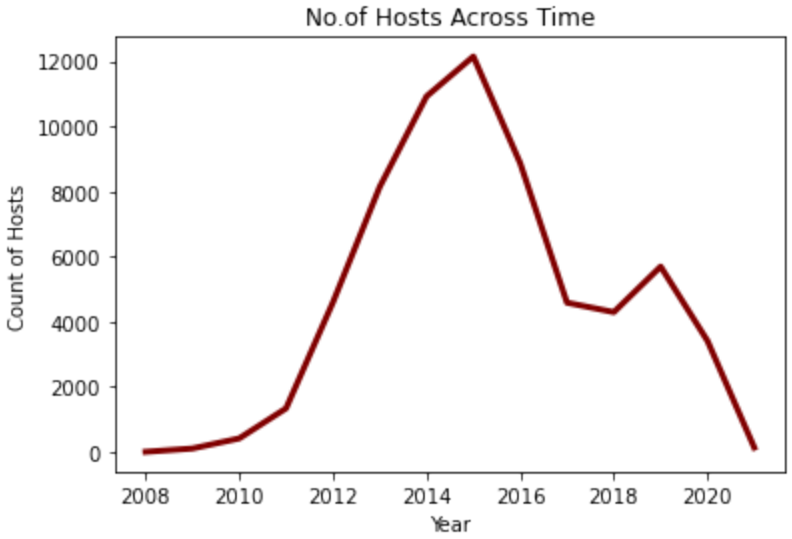


In [19]:
```
plt.barh(Paris_listings_accomodtions.index,Paris_listings_accomodtions.values, color =
plt.title('Accomodation Rates in the  Most Expensive Neighbourhood')
plt.ylabel('Accomodatation' + ('PP'))
plt.xlabel('price' + ('$'))
```

```
plt.show()
#A visual presentation of of Accomodation capacity with rates
```

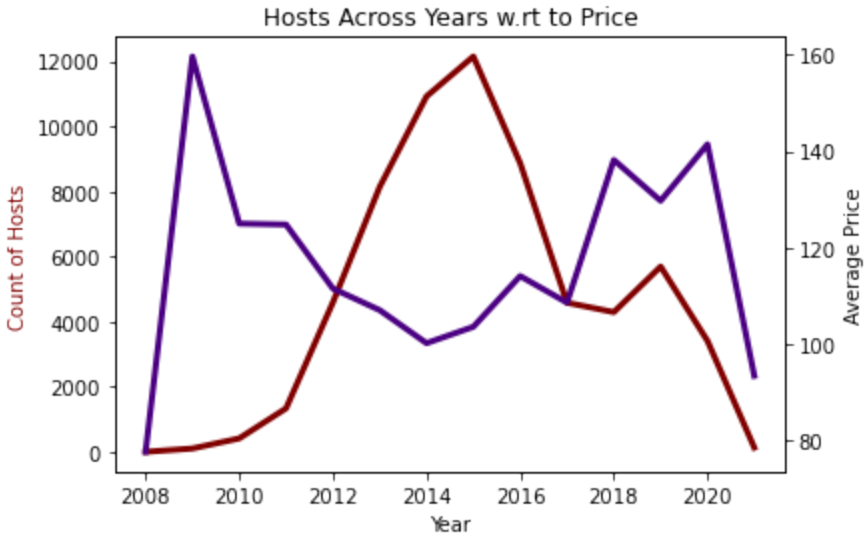


In [20]:
```
plt.plot(Paris_listings_overtime['host_since'], linestyle = 'solid',color ='maroon',li
plt.ylabel('Count of Hosts')
plt.xlabel('Year')
plt.title('No.of Hosts Across Time')
plt.show()
#A trendline of number of hosts overtime
```



In [21]:
```
plt.plot(Paris_listings_overtime['price'], linestyle = 'solid', linewidth = '3',color
plt.ylabel('Average Price')
plt.xlabel('Year')
plt.title('Average Price across Years')
plt.show()
#A trend representation of Pricing across Years
```

In [22]:
```
fig, ax1 = plt.subplots()
ax1.plot(Paris_listings_overtime['host_since'], linestyle = 'solid',color ='maroon',li
ax1.set_ylabel('Count of Hosts',color = 'maroon')
ax1.set_xlabel('Year')
ax2 = ax1.twinx()
ax2.plot(Paris_listings_overtime['price'], linestyle = 'solid', linewidth = '3',color
ax2.set_ylabel('Average Price')
plt.title('Hosts Across Years w.rt to Price')
plt.show()
#An interaction of number of hosts overtime with Pricing
```



In [23]:
```
# CONCLUSION
# The 2015 regulations impacted the Paris market with steep drop of travellers opting
# For pricing there are no clear reasons for price behaviour,other than to make the as
# within Paris due to its assumed posh and luxurious status.
# Hence is uniquely not impacted with a reduction of travellers in need of AirBnB spac
```