311 NYC

July 4, 2022

[66]:
```
import numpy as np
import pandas as pd
from pandas import Series, DataFrame
%matplotlib inline
import seaborn as sns
import matplotlib
import matplotlib.pyplot as plt
import datetime
import calendar
import scipy.stats as stat
```

[67]:
```
df = pd.read_csv("311_Service_Requests_from_2010_to_Present.csv")
```

```
/usr/local/lib/python3.7/site-packages/IPython/core/interactiveshell.py:3063:
DtypeWarning: Columns (48,49) have mixed types.Specify dtype option on import or
set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

[90]:
```
df.head(3)
```

[90]:

	Unique Key	Created Date	Closed Date	Agency	Agency Name	Complaint Type	Descriptor	Location Type	Incident Zip	Incident Address	Street Name	Cross Street 1	Cross Street 2	Intersection Street 1
0	32310363	12/31/2015 11:59:45 PM	01-01-16 0:55	NYPD	New York City Police Department	Noise - Street/Sidewalk	Loud Music/Party	Street/Sidewalk	10034.0	71 VERMILYEA AVENUE	VERMILYEA AVENUE	ACADEMY STREET	WEST 204 STREET	NaN
1	32309934	12/31/2015 11:59:44 PM	01-01-16 1:26	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	11105.0	27-07 23 AVENUE	23 AVENUE	27 STREET	28 STREET	NaN
2	32309159	12/31/2015 11:59:29 PM	01-01-16 4:51	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	10458.0	2897 VALENTINE AVENUE	VALENTINE AVENUE			

```
2  EAST 198 STREET  EAST 199 STREET                    NaN

  Intersection Street 2 Address Type      City Landmark Facility Type  Status  \
0                   NaN      ADDRESS  NEW YORK      NaN      Precinct  Closed
1                   NaN      ADDRESS   ASTORIA      NaN      Precinct  Closed
2                   NaN      ADDRESS     BRONX      NaN      Precinct  Closed

        Due Date                                Resolution Description  \
0  01-01-16 7:59  The Police Department responded and upon arriv…
1  01-01-16 7:59  The Police Department responded to the complai…
2  01-01-16 7:59  The Police Department responded and upon arriv…

  Resolution Action Updated Date Community Board    Borough  \
0                 01-01-16 0:55    12 MANHATTAN  MANHATTAN
1                 01-01-16 1:26       01 QUEENS     QUEENS
2                 01-01-16 4:51        07 BRONX      BRONX

   X Coordinate (State Plane)  Y Coordinate (State Plane) Park Facility Name  \
0                   1005409.0                   254678.0        Unspecified
1                   1007766.0                   221986.0        Unspecified
2                   1015081.0                   256380.0        Unspecified

  Park Borough  School Name School Number School Region  School Code  \
0    MANHATTAN  Unspecified   Unspecified   Unspecified  Unspecified
1       QUEENS  Unspecified   Unspecified   Unspecified  Unspecified
2        BRONX  Unspecified   Unspecified   Unspecified  Unspecified

  School Phone Number School Address  School City School State   School Zip  \
0         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
1         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
2         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified

  School Not Found  School or Citywide Complaint  Vehicle Type  \
0                N                            NaN           NaN
1                N                            NaN           NaN
2                N                            NaN           NaN

   Taxi Company Borough  Taxi Pick Up Location Bridge Highway Name  \
0                   NaN                    NaN                 NaN
1                   NaN                    NaN                 NaN
2                   NaN                    NaN                 NaN

  Bridge Highway Direction Road Ramp Bridge Highway Segment  Garage Lot Name  \
0                      NaN       NaN                    NaN              NaN
1                      NaN       NaN                    NaN              NaN
2                      NaN       NaN                    NaN              NaN
```

```
  Ferry Direction Ferry Terminal Name   Latitude  Longitude  \
0             NaN                  NaN  40.865682 -73.923501
1             NaN                  NaN  40.775945 -73.915094
2             NaN                  NaN  40.870325 -73.888525

                                  Location
0   (40.86568153633767, -73.92350095571744)
1  (40.775945312321085, -73.91509393898605)
2  (40.870324522111424, -73.88852464418646)
```

[92]:
```
#df.info()
```

[18]:
```
df.shape
```

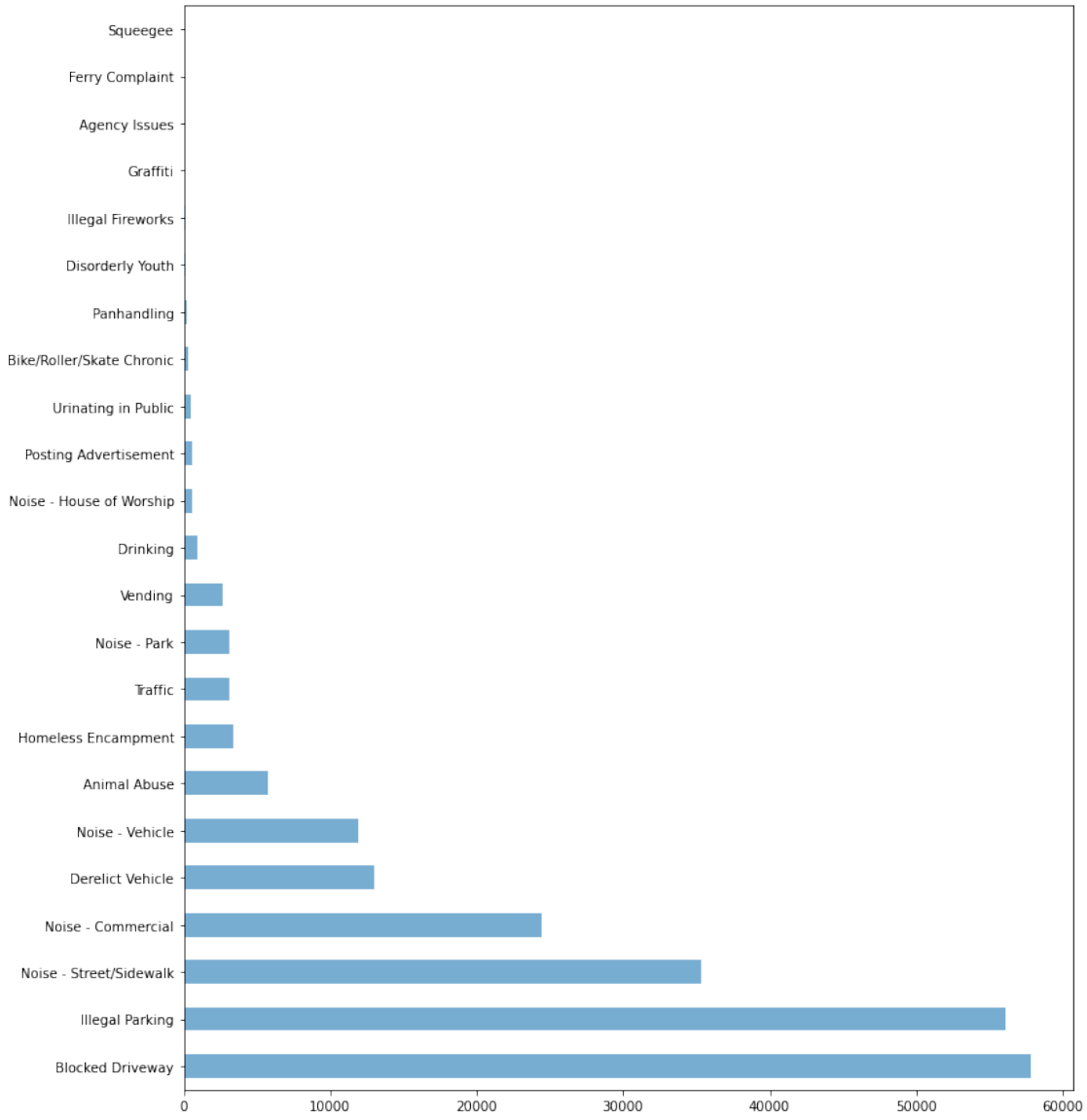
[18]:
```
(220337, 53)
```

[93]:
```
#df.describe()
```

[20]:
```
df.columns
```

[20]:
```
Index(['Unique Key', 'Created Date', 'Closed Date', 'Agency', 'Agency Name',
       'Complaint Type', 'Descriptor', 'Location Type', 'Incident Zip',
       'Incident Address', 'Street Name', 'Cross Street 1', 'Cross Street 2',
       'Intersection Street 1', 'Intersection Street 2', 'Address Type',
       'City', 'Landmark', 'Facility Type', 'Status', 'Due Date',
       'Resolution Description', 'Resolution Action Updated Date',
       'Community Board', 'Borough', 'X Coordinate (State Plane)',
       'Y Coordinate (State Plane)', 'Park Facility Name', 'Park Borough',
       'School Name', 'School Number', 'School Region', 'School Code',
       'School Phone Number', 'School Address', 'School City', 'School State',
       'School Zip', 'School Not Found', 'School or Citywide Complaint',
       'Vehicle Type', 'Taxi Company Borough', 'Taxi Pick Up Location',
       'Bridge Highway Name', 'Bridge Highway Direction', 'Road Ramp',
       'Bridge Highway Segment', 'Garage Lot Name', 'Ferry Direction',
       'Ferry Terminal Name', 'Latitude', 'Longitude', 'Location'],
      dtype='object')
```

[21]:
```
df['Complaint Type'].value_counts().plot(kind='barh',alpha=0.6, figsize=(12,15))
plt.show()
```

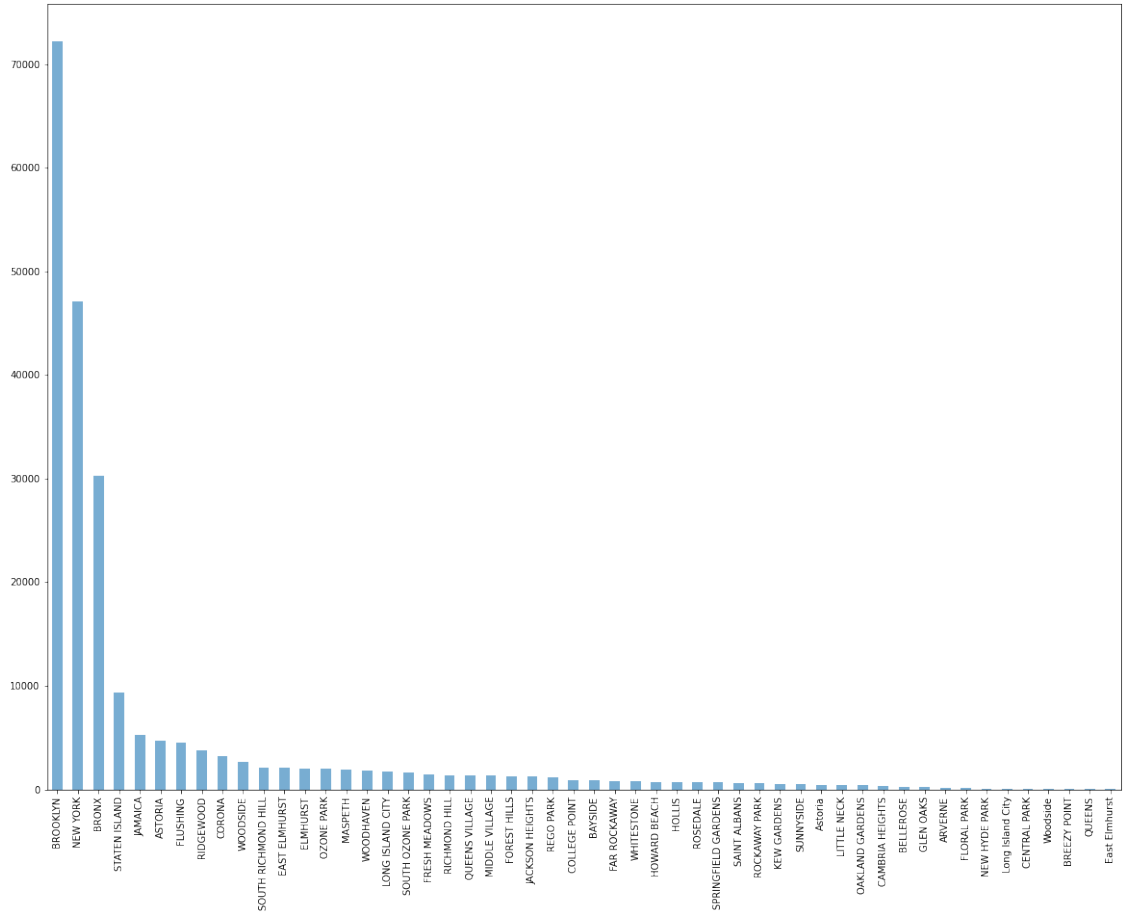


[22]:
```
df['City'].value_counts()
```

[22]:
```
BROOKLYN          72194
NEW YORK          47128
BRONX             30229
STATEN ISLAND      9335
JAMAICA            5286
ASTORIA            4658
FLUSHING           4471
RIDGEWOOD          3746
CORONA             3229
WOODSIDE           2635
```

```
SOUTH RICHMOND HILL     2100
EAST ELMHURST           2091
ELMHURST                2003
OZONE PARK              1994
MASPETH                 1865
WOODHAVEN               1829
LONG ISLAND CITY        1768
SOUTH OZONE PARK        1618
FRESH MEADOWS           1463
RICHMOND HILL           1364
QUEENS VILLAGE          1343
MIDDLE VILLAGE          1323
FOREST HILLS            1267
JACKSON HEIGHTS         1248
REGO PARK               1140
COLLEGE POINT            921
BAYSIDE                  874
FAR ROCKAWAY             840
WHITESTONE               804
HOWARD BEACH             723
HOLLIS                   700
ROSEDALE                 682
SPRINGFIELD GARDENS      668
SAINT ALBANS             641
ROCKAWAY PARK            590
KEW GARDENS              540
SUNNYSIDE                504
Astoria                  428
LITTLE NECK              412
OAKLAND GARDENS          404
CAMBRIA HEIGHTS          341
BELLEROSE                256
GLEN OAKS                223
ARVERNE                  173
FLORAL PARK              111
NEW HYDE PARK             75
Long Island City          70
CENTRAL PARK              58
Woodside                  42
BREEZY POINT              24
QUEENS                    24
East Elmhurst              7
Name: City, dtype: int64
```

[23]:
```
df['City'].value_counts().plot(kind='bar', alpha=0.6, figsize=(20,15))
plt.show()
```



[24]:
```
df[['Complaint Type','City']].head(50)
```

[24]:

	Complaint Type	City
0	Noise - Street/Sidewalk	NEW YORK
1	Blocked Driveway	ASTORIA
2	Blocked Driveway	BRONX
3	Illegal Parking	BRONX
4	Illegal Parking	ELMHURST
5	Illegal Parking	BROOKLYN
6	Illegal Parking	NEW YORK
7	Blocked Driveway	BRONX
8	Illegal Parking	KEW GARDENS
9	Blocked Driveway	BROOKLYN
10	Blocked Driveway	JACKSON HEIGHTS
11	Blocked Driveway	BRONX
12	Noise - Street/Sidewalk	BRONX
13	Illegal Parking	BROOKLYN
14	Derelict Vehicle	MIDDLE VILLAGE

```
15          Blocked Driveway            REGO PARK
16          Blocked Driveway         SAINT ALBANS
17        Noise - Commercial             BROOKLYN
18        Noise - Commercial             BROOKLYN
19   Noise - Street/Sidewalk             NEW YORK
20           Illegal Parking                BRONX
21           Illegal Parking       MIDDLE VILLAGE
22        Noise - Commercial             BROOKLYN
23           Illegal Parking             NEW YORK
24          Blocked Driveway                BRONX
25          Blocked Driveway              JAMAICA
26  Noise - House of Worship             NEW YORK
27          Blocked Driveway  SOUTH RICHMOND HILL
28           Illegal Parking             NEW YORK
29        Noise - Commercial             BROOKLYN
30        Noise - Commercial             BROOKLYN
31        Noise - Commercial             BROOKLYN
32          Blocked Driveway                BRONX
33           Illegal Parking                  NaN
34          Blocked Driveway            RIDGEWOOD
35           Illegal Parking         HOWARD BEACH
36          Blocked Driveway             BROOKLYN
37           Illegal Parking         FOREST HILLS
38   Noise - Street/Sidewalk             BROOKLYN
39     Posting Advertisement        STATEN ISLAND
40        Noise - Commercial             NEW YORK
41        Noise - Commercial             BROOKLYN
42     Posting Advertisement        STATEN ISLAND
43        Noise - Commercial             BROOKLYN
44          Blocked Driveway           OZONE PARK
45        Noise - Commercial             NEW YORK
46     Posting Advertisement        STATEN ISLAND
47           Illegal Parking             NEW YORK
48        Noise - Commercial             NEW YORK
49     Posting Advertisement        STATEN ISLAND
```

[26]:
```
groupBycomplainType = df.groupby('Complaint Type')
```

[28]:
```
grp_data = groupBycomplainType.get_group('Blocked Driveway')
grp_data.shape
```

[28]:
```
(57842, 53)
```

[30]:
```
df.isnull().sum()
```

[30]:
```
Unique Key                      0
Created Date                    0
```

Closed Date	1583
Agency	0
Agency Name	0
Complaint Type	0
Descriptor	4554
Location Type	128
Incident Zip	1875
Incident Address	31776
Street Name	31776
Cross Street 1	35406
Cross Street 2	35736
Intersection Street 1	188977
Intersection Street 2	189313
Address Type	2018
City	1875
Landmark	220080
Facility Type	1584
Status	1
Due Date	4
Resolution Description	1
Resolution Action Updated Date	1606
Community Board	1
Borough	1
X Coordinate (State Plane)	2544
Y Coordinate (State Plane)	2544
Park Facility Name	1
Park Borough	1
School Name	1
School Number	1
School Region	1
School Code	1
School Phone Number	1
School Address	1
School City	1
School State	1
School Zip	1
School Not Found	1
School or Citywide Complaint	220337
Vehicle Type	220337
Taxi Company Borough	220337
Taxi Pick Up Location	220337
Bridge Highway Name	220156
Bridge Highway Direction	220156
Road Ramp	220176
Bridge Highway Segment	220176
Garage Lot Name	220337
Ferry Direction	220336

```
Ferry Terminal Name               220335
Latitude                            2544
Longitude                           2544
Location                            2544
dtype: int64
```

[33]:
```
df['Agency Name'].value_counts()
```

[33]:
```
New York City Police Department    300690
Internal Affairs Bureau                 6
NYPD                                    2
Name: Agency Name, dtype: int64
```

[34]:
```
df['Complaint Type'].value_counts().head(5)
```

[34]:
```
Blocked Driveway           77044
Illegal Parking            75361
Noise - Street/Sidewalk    48612
Noise - Commercial         35577
Derelict Vehicle           17718
Name: Complaint Type, dtype: int64
```

[35]:
```
df['Latitude'].value_counts().head(5)
```

[35]:
```
40.830362    902
40.721959    505
40.703819    480
40.647132    362
40.708726    341
Name: Latitude, dtype: int64
```

[5]:
```
data_mod = df.drop(columns=['Unique Key'],axis=1)
```

[40]:
```
data_mod.columns
```

[40]:
```
Index(['Created Date', 'Closed Date', 'Agency', 'Agency Name',
       'Complaint Type', 'Descriptor', 'Location Type', 'Incident Zip',
       'Incident Address', 'Street Name', 'Cross Street 1', 'Cross Street 2',
       'Intersection Street 1', 'Intersection Street 2', 'Address Type',
       'City', 'Landmark', 'Facility Type', 'Status', 'Due Date',
       'Resolution Description', 'Resolution Action Updated Date',
       'Community Board', 'Borough', 'X Coordinate (State Plane)',
       'Y Coordinate (State Plane)', 'Park Facility Name', 'Park Borough',
       'School Name', 'School Number', 'School Region', 'School Code',
       'School Phone Number', 'School Address', 'School City', 'School State',
       'School Zip', 'School Not Found', 'School or Citywide Complaint',
       'Vehicle Type', 'Taxi Company Borough', 'Taxi Pick Up Location',
```

```
       'Bridge Highway Name', 'Bridge Highway Direction', 'Road Ramp',
       'Bridge Highway Segment', 'Garage Lot Name', 'Ferry Direction',
       'Ferry Terminal Name', 'Latitude', 'Longitude', 'Location'],
      dtype='object')
```

[41]:
```
data_mod.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 300698 entries, 0 to 300697
Data columns (total 52 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Created Date                    300698 non-null  object
 1   Closed Date                     298534 non-null  object
 2   Agency                          300698 non-null  object
 3   Agency Name                     300698 non-null  object
 4   Complaint Type                  300698 non-null  object
 5   Descriptor                      294784 non-null  object
 6   Location Type                   300567 non-null  object
 7   Incident Zip                    298083 non-null  float64
 8   Incident Address                256288 non-null  object
 9   Street Name                     256288 non-null  object
 10  Cross Street 1                  251419 non-null  object
 11  Cross Street 2                  250919 non-null  object
 12  Intersection Street 1           43858 non-null   object
 13  Intersection Street 2           43362 non-null   object
 14  Address Type                    297883 non-null  object
 15  City                            298084 non-null  object
 16  Landmark                        349 non-null     object
 17  Facility Type                   298527 non-null  object
 18  Status                          300698 non-null  object
 19  Due Date                        300695 non-null  object
 20  Resolution Description          300698 non-null  object
 21  Resolution Action Updated Date  298511 non-null  object
 22  Community Board                 300698 non-null  object
 23  Borough                         300698 non-null  object
 24  X Coordinate (State Plane)      297158 non-null  float64
 25  Y Coordinate (State Plane)      297158 non-null  float64
 26  Park Facility Name              300698 non-null  object
 27  Park Borough                    300698 non-null  object
 28  School Name                     300698 non-null  object
 29  School Number                   300698 non-null  object
 30  School Region                   300697 non-null  object
 31  School Code                     300697 non-null  object
 32  School Phone Number             300698 non-null  object
 33  School Address                  300698 non-null  object
 34  School City                     300698 non-null  object
```

```
 35  School State                    300698 non-null  object
 36  School Zip                      300697 non-null  object
 37  School Not Found                300698 non-null  object
 38  School or Citywide Complaint    0 non-null       float64
 39  Vehicle Type                    0 non-null       float64
 40  Taxi Company Borough            0 non-null       float64
 41  Taxi Pick Up Location           0 non-null       float64
 42  Bridge Highway Name             243 non-null     object
 43  Bridge Highway Direction        243 non-null     object
 44  Road Ramp                       213 non-null     object
 45  Bridge Highway Segment          213 non-null     object
 46  Garage Lot Name                 0 non-null       float64
 47  Ferry Direction                 1 non-null       object
 48  Ferry Terminal Name             2 non-null       object
 49  Latitude                        297158 non-null  float64
 50  Longitude                       297158 non-null  float64
 51  Location                        297158 non-null  object
dtypes: float64(10), object(42)
memory usage: 119.3+ MB
```

0.1 2. Read or convert the columns 'Created Date' and Closed Date' to datetime datatype and create a new column 'Request_Closing_Time' as the time elapsed between request creation and request closing

[44]:
```
data_mod['Closed Date'] = pd.to_datetime(data_mod['Closed Date'])
data_mod['Created Date'] = pd.to_datetime(data_mod['Created Date'])

data_mod['Request_Closing_Time'] = data_mod['Closed Date'] - data_mod['Created␣
↪Date']

#data_mod = data_mod[(data_mod.Request_Closing_Time)>=0]
```

[41]:
```
data_mod.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 300698 entries, 0 to 300697
Data columns (total 52 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Created Date                    300698 non-null  object
 1   Closed Date                     298534 non-null  object
 2   Agency                          300698 non-null  object
 3   Agency Name                     300698 non-null  object
 4   Complaint Type                  300698 non-null  object
 5   Descriptor                      294784 non-null  object
 6   Location Type                   300567 non-null  object
```

```
 7   Incident Zip                     298083 non-null  float64
 8   Incident Address                 256288 non-null  object
 9   Street Name                      256288 non-null  object
 10  Cross Street 1                   251419 non-null  object
 11  Cross Street 2                   250919 non-null  object
 12  Intersection Street 1            43858 non-null   object
 13  Intersection Street 2            43362 non-null   object
 14  Address Type                     297883 non-null  object
 15  City                             298084 non-null  object
 16  Landmark                         349 non-null     object
 17  Facility Type                    298527 non-null  object
 18  Status                           300698 non-null  object
 19  Due Date                         300695 non-null  object
 20  Resolution Description           300698 non-null  object
 21  Resolution Action Updated Date   298511 non-null  object
 22  Community Board                  300698 non-null  object
 23  Borough                          300698 non-null  object
 24  X Coordinate (State Plane)       297158 non-null  float64
 25  Y Coordinate (State Plane)       297158 non-null  float64
 26  Park Facility Name               300698 non-null  object
 27  Park Borough                     300698 non-null  object
 28  School Name                      300698 non-null  object
 29  School Number                    300698 non-null  object
 30  School Region                    300697 non-null  object
 31  School Code                      300697 non-null  object
 32  School Phone Number              300698 non-null  object
 33  School Address                   300698 non-null  object
 34  School City                      300698 non-null  object
 35  School State                     300698 non-null  object
 36  School Zip                       300697 non-null  object
 37  School Not Found                 300698 non-null  object
 38  School or Citywide Complaint     0 non-null       float64
 39  Vehicle Type                     0 non-null       float64
 40  Taxi Company Borough             0 non-null       float64
 41  Taxi Pick Up Location            0 non-null       float64
 42  Bridge Highway Name              243 non-null     object
 43  Bridge Highway Direction         243 non-null     object
 44  Road Ramp                        213 non-null     object
 45  Bridge Highway Segment           213 non-null     object
 46  Garage Lot Name                  0 non-null       float64
 47  Ferry Direction                  1 non-null       object
 48  Ferry Terminal Name              2 non-null       object
 49  Latitude                         297158 non-null  float64
 50  Longitude                        297158 non-null  float64
 51  Location                         297158 non-null  object
dtypes: float64(10), object(42)
memory usage: 119.3+ MB
```

[45]:
```
data_mod.sample(4)
```

[45]:

```
              Created Date         Closed Date Agency  \
209227 2015-06-22 17:04:47 2015-06-23 02:37:17   NYPD
70270  2015-10-23 12:28:16 2015-10-23 14:38:00   NYPD
215864 2015-06-17 08:45:28 2015-06-17 09:12:09   NYPD
296041 2015-04-03 16:56:00 2015-04-03 18:45:00   NYPD

                           Agency Name    Complaint Type  \
209227  New York City Police Department   Illegal Parking
70270   New York City Police Department  Blocked Driveway
215864  New York City Police Department  Blocked Driveway
296041  New York City Police Department   Illegal Parking

                         Descriptor    Location Type  Incident Zip  \
209227  Posted Parking Sign Violation  Street/Sidewalk       10305.0
70270                 Partial Access  Street/Sidewalk       11218.0
215864                Partial Access  Street/Sidewalk       11417.0
296041              Blocked Sidewalk  Street/Sidewalk       10463.0

                    Incident Address                Street Name  …  \
209227                           NaN                        NaN  …
70270                816 BEVERLY ROAD              BEVERLY ROAD  …
215864                           NaN                        NaN  …
296041  3498 FORT INDEPENDENCE STREET  FORT INDEPENDENCE STREET  …

       Bridge Highway Direction Road Ramp Bridge Highway Segment  \
209227                      NaN       NaN                    NaN
70270                       NaN       NaN                    NaN
215864                      NaN       NaN                    NaN
296041                      NaN       NaN                    NaN

       Garage Lot Name Ferry Direction Ferry Terminal Name   Latitude  \
209227             NaN             NaN                 NaN  40.588447
70270              NaN             NaN                 NaN  40.643593
215864             NaN             NaN                 NaN  40.674163
296041             NaN             NaN                 NaN  40.882262

        Longitude                                  Location  \
209227 -74.095908   (40.58844673355417, -74.09590820834552)
70270  -73.971400  (40.643593154509716, -73.97139978812707)
215864 -73.851299   (40.67416255314253, -73.85129862594015)
296041 -73.898182  (40.882261883639515, -73.89818195820193)

       Request_Closing_Time
209227      0 days 09:32:30
70270       0 days 02:09:44
```

```
215864      0 days 00:26:41
296041      0 days 01:49:00

[4 rows x 53 columns]
```

0.2 3. Provide major insights/patterns that you can offer in a visual format (graphs or tables); at least 4 major conclusions that you can come up with after generic data mining

[18]:
```
data_complaint = df['Complaint Type'].value_counts()
data_complaint = data_complaint.to_frame()
data_complaint = data_complaint.rename(columns={'Complaint Type':'Counts'})
data_complaint
```

[18]:

	Counts
Blocked Driveway	77044
Illegal Parking	75361
Noise - Street/Sidewalk	48612
Noise - Commercial	35577
Derelict Vehicle	17718
Noise - Vehicle	17083
Animal Abuse	7778
Traffic	4498
Homeless Encampment	4416
Noise - Park	4042
Vending	3802
Drinking	1280
Noise - House of Worship	931
Posting Advertisement	650
Urinating in Public	592
Bike/Roller/Skate Chronic	427
Panhandling	307
Disorderly Youth	286
Illegal Fireworks	168
Graffiti	113
Agency Issues	6
Squeegee	4
Ferry Complaint	2
Animal in a Park	1

[19]:
```
data_complaint['Percentage'] = np.around((data_complaint.Counts/data_complaint.
↪Counts.sum())*100,decimals=2)
data_complaint
```

[19]:

	Counts	Percentage
Blocked Driveway	77044	25.62
Illegal Parking	75361	25.06
Noise - Street/Sidewalk	48612	16.17
Noise - Commercial	35577	11.83
Derelict Vehicle	17718	5.89
Noise - Vehicle	17083	5.68
Animal Abuse	7778	2.59
Traffic	4498	1.50
Homeless Encampment	4416	1.47
Noise - Park	4042	1.34
Vending	3802	1.26
Drinking	1280	0.43
Noise - House of Worship	931	0.31
Posting Advertisement	650	0.22
Urinating in Public	592	0.20
Bike/Roller/Skate Chronic	427	0.14
Panhandling	307	0.10
Disorderly Youth	286	0.10
Illegal Fireworks	168	0.06
Graffiti	113	0.04
Agency Issues	6	0.00
Squeegee	4	0.00
Ferry Complaint	2	0.00
Animal in a Park	1	0.00

[20]:
```
data_complaint = data_complaint[data_complaint.Percentage>1.0]
data_complaint = data_complaint.reset_index()
data_complaint = data_complaint.rename(columns={'index':'Complaint Type'})
data_complaint
```

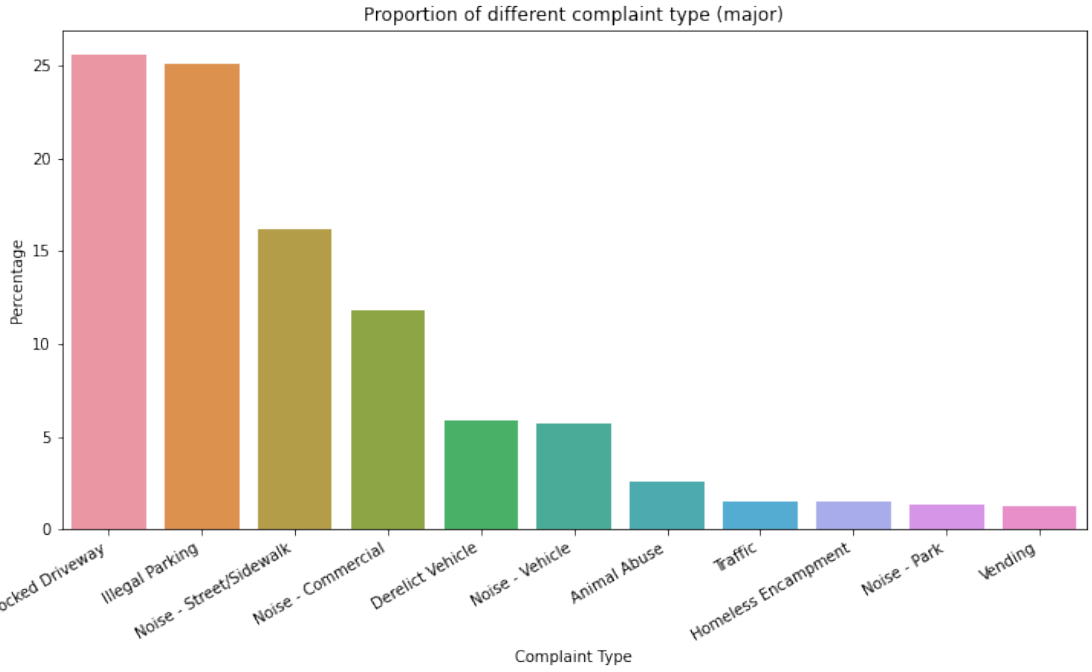
[20]:

	Complaint Type	Counts	Percentage
0	Blocked Driveway	77044	25.62
1	Illegal Parking	75361	25.06
2	Noise - Street/Sidewalk	48612	16.17
3	Noise - Commercial	35577	11.83
4	Derelict Vehicle	17718	5.89
5	Noise - Vehicle	17083	5.68
6	Animal Abuse	7778	2.59
7	Traffic	4498	1.50
8	Homeless Encampment	4416	1.47
9	Noise - Park	4042	1.34
10	Vending	3802	1.26

[25]:
```
plt.figure(figsize=(12,6))
com_type = sns.barplot(x=data_complaint['Complaint Type'],y=data_complaint.
↪Percentage,data=data_complaint)
```

```
com_type.set_xticklabels(com_type.get_xticklabels(), rotation=30, ha="right")
plt.title('Proportion of different complaint type (major)')
```

[25]:
```
Text(0.5, 1.0, 'Proportion of different complaint type (major)')
```



[26]:
```
data_descriptor = np.around(((data_mod['Descriptor'].value_counts()*100) /␣
 ↪data_mod['Descriptor'].value_counts().sum()),
                            decimals=2)
data_descriptor = data_descriptor.to_frame()
data_descriptor = data_descriptor.rename(columns={'Descriptor':'Percentage'})
data_descriptor['Descriptor'] = data_descriptor.index
cols = data_descriptor.columns.tolist()
cols = cols[-1:]+cols[:-1]
data_descriptor = data_descriptor[cols]
data_descriptor = data_descriptor[(data_descriptor.Percentage) >= 2.0]
data_descriptor = data_descriptor.reset_index()
data_descriptor = data_descriptor.drop(columns=['index'],axis=1)
data_descriptor
```

[26]:

	Descriptor	Percentage
0	Loud Music/Party	20.84
1	No Access	19.33
2	Posted Parking Sign Violation	7.61
3	Loud Talking	7.32
4	Partial Access	6.81

```
5             With License Plate        6.01
6                Blocked Hydrant        5.46
7   Commercial Overnight Parking        4.13
8                Car/Truck Music        3.82
9               Blocked Sidewalk        3.77
```

[27]:
```
data_location_type = np.around(((data_mod['Location Type'].value_counts()*100) /
 ↪ data_mod['Location Type'].value_counts().sum()),
                               decimals=2)
data_location_type = data_location_type.to_frame()
data_location_type = data_location_type.rename(columns={'Location Type':
 ↪'Percentage'})
data_location_type['Location Type'] = data_location_type.index
cols = data_location_type.columns.tolist()
cols = cols[-1:]+cols[:-1]
data_location_type = data_location_type[cols]
data_location_type = data_location_type[(data_location_type.Percentage) >= 0.1]
data_location_type = data_location_type.reset_index()
data_location_type = data_location_type.drop(columns=['index'],axis=1)
data_location_type
```

[27]:
```
                Location Type  Percentage
0              Street/Sidewalk       82.94
1             Store/Commercial        6.78
2          Club/Bar/Restaurant        5.78
3  Residential Building/House        2.32
4              Park/Playground        1.59
5             House of Worship        0.31
```

[28]:
```
data_city = np.around(((data_mod['City'].value_counts()*100) / data_mod['City'].
 ↪value_counts().sum()),
                               decimals=2)
data_city = data_city.to_frame()
data_city = data_city.rename(columns={'City':'Percentage'})
data_city['City'] = data_city.index
cols = data_city.columns.tolist()
cols = cols[-1:]+cols[:-1]
data_city = data_city[cols]
data_city = data_city[(data_city.Percentage) >= 1.0]
data_city = data_city.reset_index()
data_city = data_city.drop(columns=['index'],axis=1)
data_city
```

[28]:
```
            City  Percentage
0       BROOKLYN       32.98
1       NEW YORK       22.14
2          BRONX       13.65
```

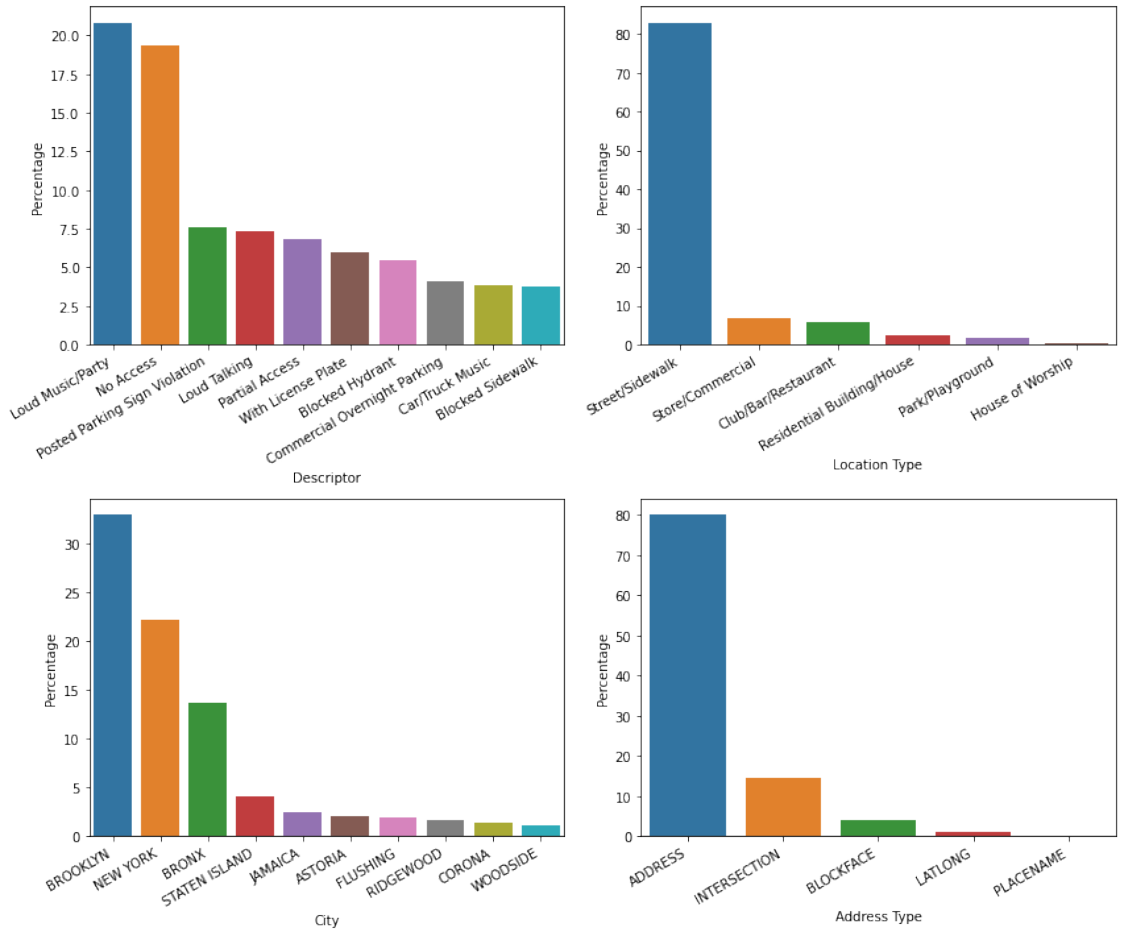
```
3  STATEN ISLAND        4.14
4        JAMAICA        2.45
5        ASTORIA        2.12
6       FLUSHING        2.00
7      RIDGEWOOD        1.73
8         CORONA        1.44
9       WOODSIDE        1.19
```

[29]:
```
data_address_type = np.around(((data_mod['Address Type'].value_counts()*100) /␣
↪data_mod['Address Type'].value_counts().sum()),
                              decimals=2)
data_address_type = data_address_type.to_frame()
data_address_type = data_address_type.rename(columns={'Address Type':
↪'Percentage'})
data_address_type['Address Type'] = data_address_type.index
cols = data_address_type.columns.tolist()
cols = cols[-1:]+cols[:-1]
data_address_type = data_address_type[cols]
#data_address_type = data_address_type[(data_address_type.Percentage) >= 1.0]
data_address_type = data_address_type.reset_index()
data_address_type = data_address_type.drop(columns=['index'],axis=1)
data_address_type
```

[29]:
```
    Address Type  Percentage
0        ADDRESS       80.11
1   INTERSECTION       14.56
2      BLOCKFACE        4.03
3        LATLONG        1.18
4      PLACENAME        0.12
```

[30]:
```
fig, ax = plt.subplots(2, 2, figsize=(12, 10))

#sns.set_theme(style="whitegrid")
#plt.suptitle("Proportion of different outcomes for few interesting features.")

descriptor = sns.barplot(ax=ax[0,0],x=data_descriptor.
↪Descriptor,y=data_descriptor.Percentage,)
descriptor.set_xticklabels(descriptor.get_xticklabels(), rotation=30,␣
↪ha="right")

location_type = sns.barplot(ax=ax[0,1],x=data_location_type['Location␣
↪Type'],y=data_location_type.Percentage,)
location_type.set_xticklabels(location_type.get_xticklabels(), rotation=30,␣
↪ha="right")

city = sns.barplot(ax=ax[1,0],x=data_city['City'],y=data_city.Percentage,)
city.set_xticklabels(city.get_xticklabels(), rotation=30, ha="right")
```

```
address = sns.barplot(ax=ax[1,1],x=data_address_type['Address␣
 ↪Type'],y=data_address_type.Percentage,)
address.set_xticklabels(address.get_xticklabels(), rotation=30, ha="right")


#plt.subplots_adjust(left=None, bottom=None, right=None, top=0.0, wspace=None,␣
 ↪hspace=None)
plt.tight_layout()
```



[47]:
```
data_place_CType_RCTime = data_mod[['City','Complaint␣
 ↪Type','Request_Closing_Time']]
data_place_CType_RCTime.dropna(subset = ['City','Complaint␣
 ↪Type','Request_Closing_Time'], inplace = True)
data_place_CType_RCTime['DeltaT(in_hr.)'] = np.around(␣
 ↪(data_place_CType_RCTime['Request_Closing_Time'].astype(np.int64)/
```

```
                                                    (pow(10,9)*3600) ),␣
↪decimals=2)
neg_time = data_place_CType_RCTime[data_place_CType_RCTime['DeltaT(in_hr.)'] <␣
↪0].sum()
print('The no negative time difference (Created Time > Clossing Time, which is␣
↪not possible) = \n',neg_time)
#data_place_CType_RCTime['DeltaT(in sec)/Avg.'] = np.
↪around((data_place_CType_RCTime['DeltaT(in sec)']/Avarage_time),decimals=1)
data_place_CType_RCTime.head(6)
```

```
The no negative time difference (Created Time > Clossing Time, which is not
possible) =
 City                    0.0
Complaint Type          0.0
Request_Closing_Time    0.0
DeltaT(in_hr.)          0.0
dtype: float64
```

```
/usr/local/lib/python3.7/site-packages/ipykernel_launcher.py:2:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

/usr/local/lib/python3.7/site-packages/ipykernel_launcher.py:4:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  after removing the cwd from sys.path.
```

[47]:

	City	Complaint Type	Request_Closing_Time	DeltaT(in_hr.)
0	NEW YORK	Noise - Street/Sidewalk	0 days 00:55:15	0.92
1	ASTORIA	Blocked Driveway	0 days 01:26:16	1.44
2	BRONX	Blocked Driveway	0 days 04:51:31	4.86
3	BRONX	Illegal Parking	0 days 07:45:14	7.75
4	ELMHURST	Illegal Parking	0 days 03:27:02	3.45
5	BROOKLYN	Illegal Parking	0 days 01:53:30	1.89

[48]:
```
Avarage_time = np.around((data_place_CType_RCTime['DeltaT(in_hr.)'].
↪mean()),decimals=2)
print('Avarage time gap between logging the complaint and problem solved =␣
↪',Avarage_time, 'hour')
```

```
Central_val = np.around((data_place_CType_RCTime['DeltaT(in_hr.)'].
 ↪median()),decimals=2)
print('Central value of the distribution = ',Central_val, 'hour')
Most_occoor = np.around((data_place_CType_RCTime['DeltaT(in_hr.)'].
 ↪mode()),decimals=2)
print('Most occered value = ',Most_occoor, 'hour')
stand_dev = np.around((data_place_CType_RCTime['DeltaT(in_hr.)'].
 ↪std()),decimals=2)
print('Deviation is = ',stand_dev)
```

```
Avarage time gap between logging the complaint and problem solved =  4.31 hour
Central value of the distribution =  2.71 hour
Most occered value =  0    0.88
dtype: float64 hour
Deviation is =  6.08
```

[49]:
```
conditions = [data_place_CType_RCTime['DeltaT(in_hr.)'] <= 0.5,
              (0.50 < data_place_CType_RCTime['DeltaT(in_hr.)']) &␣
 ↪(data_place_CType_RCTime['DeltaT(in_hr.)'] <= 1.00),
              (1.00 < data_place_CType_RCTime['DeltaT(in_hr.)']) &␣
 ↪(data_place_CType_RCTime['DeltaT(in_hr.)'] <= 2.00),
              (2.00 < data_place_CType_RCTime['DeltaT(in_hr.)']) &␣
 ↪(data_place_CType_RCTime['DeltaT(in_hr.)'] <= 6.00),
              (6.00 < data_place_CType_RCTime['DeltaT(in_hr.)']) &␣
 ↪(data_place_CType_RCTime['DeltaT(in_hr.)'] <= 10.00),
              (10.00 < data_place_CType_RCTime['DeltaT(in_hr.)'])]

choices = ['Super fast','Very fast','Fast','Normal','Slow','Super Slow']

data_place_CType_RCTime['Solution Status'] = np.select(conditions,choices)
```

```
/usr/local/lib/python3.7/site-packages/ipykernel_launcher.py:10:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  # Remove the CWD from sys.path while we load stuff.
```

[50]:
```
data_place_CType_RCTime.head(6)
```

[50]:

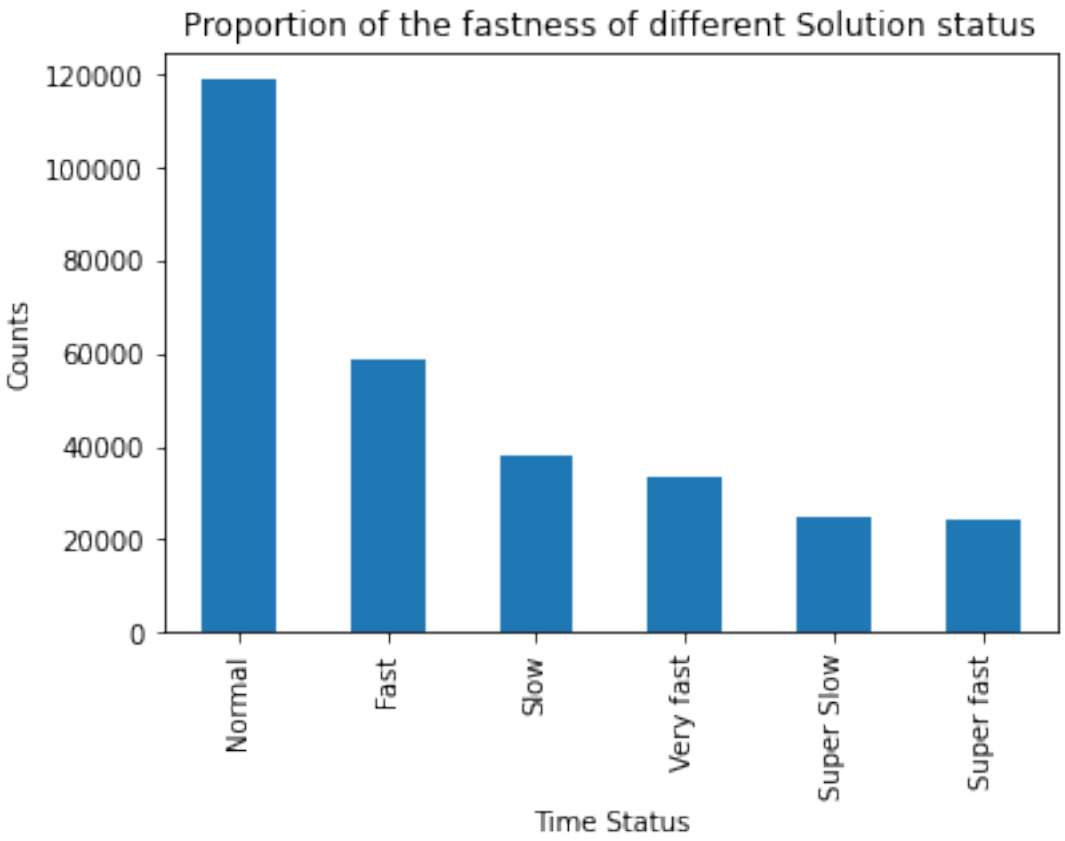
	City	Complaint Type	Request_Closing_Time	DeltaT(in_hr.)	\
0	NEW YORK	Noise - Street/Sidewalk	0 days 00:55:15	0.92	
1	ASTORIA	Blocked Driveway	0 days 01:26:16	1.44	
2	BRONX	Blocked Driveway	0 days 04:51:31	4.86	
3	BRONX	Illegal Parking	0 days 07:45:14	7.75	

```
4  ELMHURST          Illegal Parking      0 days 03:27:02            3.45
5  BROOKLYN          Illegal Parking      0 days 01:53:30            1.89

  Solution Status
0       Very fast
1            Fast
2          Normal
3            Slow
4          Normal
5            Fast
```

[51]:
```
data_place_CType_RCTime['Solution Status'].value_counts()
```

[51]:
```
Normal        118955
Fast           58549
Slow           38068
Very fast      33459
Super Slow     24871
Super fast     24126
Name: Solution Status, dtype: int64
```

[52]:
```
data_place_CType_RCTime['Solution Status'].value_counts().plot(kind='bar')
plt.xlabel('Time Status')
plt.ylabel('Counts')
plt.title('Proportion of the fastness of different Solution status')
plt.show()
plt.tight_layout()
```




```
<Figure size 432x288 with 0 Axes>
```

[53]:
```
data_mod['Created Date'].head(5)
```

[53]:
```
0   2015-12-31 23:59:45
1   2015-12-31 23:59:44
2   2015-12-31 23:59:29
3   2015-12-31 23:57:46
4   2015-12-31 23:56:58
Name: Created Date, dtype: datetime64[ns]
```

[54]:
```
Year_Month_Day = pd.to_datetime(data_mod['Created Date'].dt.date)
Month_Day = pd.DataFrame()
Month_Day['Date'] = pd.to_datetime(Year_Month_Day.dt.date)
Month_Day['Month'] = Year_Month_Day.dt.month
Month_Day['Day'] = Year_Month_Day.dt.day
Month_Day['Month Name'] = Month_Day['Month'].apply(lambda x: calendar.
 ↪month_abbr[x])
Month_Day['Day No'] = Month_Day['Date'].dt.weekday
```

```
Month_Day['Day Name'] = Month_Day['Day No'].map({0:'Monday',1:'Tuesday',2:
 ↪'Wednesday',3:'Thursday',4:'Friday',
                                                 5:'Saturday',6:'Sunday'})
Month_Day.sample(20)
```

[54]:

	Date	Month	Day	Month Name	Day No	Day Name
277477	2015-04-24	4	24	Apr	4	Friday
243330	2015-05-24	5	24	May	6	Sunday
212788	2015-06-19	6	19	Jun	4	Friday
238757	2015-05-28	5	28	May	3	Thursday
291062	2015-04-09	4	9	Apr	3	Thursday
109290	2015-09-18	9	18	Sep	4	Friday
289727	2015-04-11	4	11	Apr	5	Saturday
176333	2015-07-21	7	21	Jul	1	Tuesday
287432	2015-04-14	4	14	Apr	1	Tuesday
217586	2015-06-15	6	15	Jun	0	Monday
128737	2015-09-01	9	1	Sep	1	Tuesday
161458	2015-08-03	8	3	Aug	0	Monday
165398	2015-07-31	7	31	Jul	4	Friday
1024	2015-12-30	12	30	Dec	2	Wednesday
265173	2015-05-06	5	6	May	2	Wednesday
136400	2015-08-26	8	26	Aug	2	Wednesday
224260	2015-06-09	6	9	Jun	1	Tuesday
136661	2015-08-25	8	25	Aug	1	Tuesday
277224	2015-04-24	4	24	Apr	4	Friday
1815	2015-12-29	12	29	Dec	1	Tuesday

[55]:
```
Month_plot = Month_Day['Month Name'].value_counts()
Month_plot = Month_plot.to_frame()
Month_plot = Month_plot.rename(columns={'Month Name':'Counts'})
Month_plot
```

[55]:

	Counts
May	36437
Sep	35427
Jun	35315
Aug	34956
Jul	34888
Oct	32605
Nov	30773
Dec	30521
Apr	27305
Mar	2471

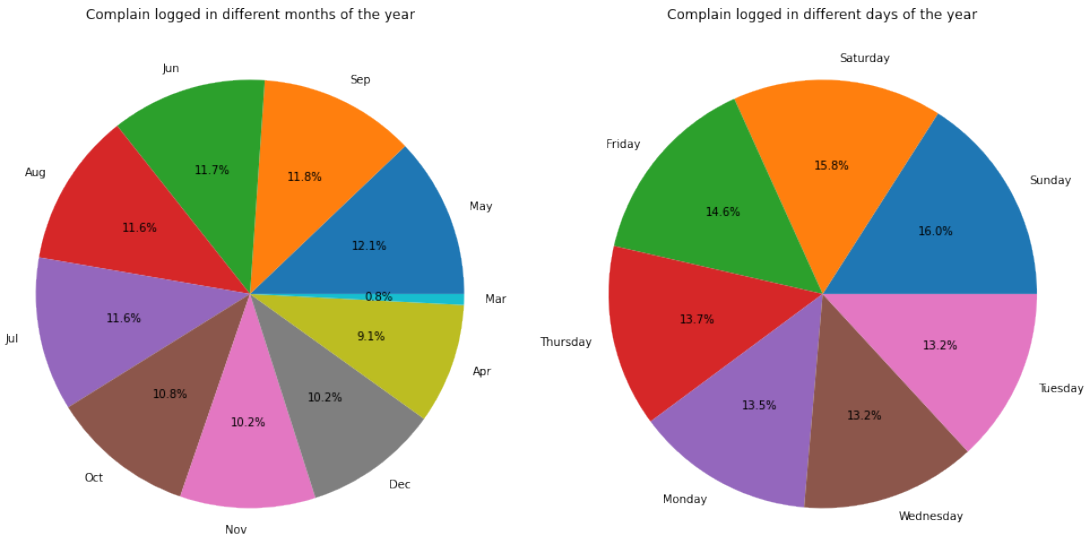
[56]:
```
Day_plot = Month_Day['Day Name'].value_counts()
Day_plot = Day_plot.to_frame()
Day_plot = Day_plot.rename(columns={'Day Name':'Counts'})
```

```
Day_plot
```

[56]:

	Counts
Sunday	47969
Saturday	47564
Friday	43995
Thursday	41342
Monday	40489
Wednesday	39788
Tuesday	39551

[57]:
```
fig, axes = plt.subplots(1,2, figsize=(14,8))

axes[0].pie(Month_plot['Counts'], labels = Month_plot.index,autopct='%1.1f%%')
axes[0].set_title('Complain logged in different months of the year')

axes[1].pie(Day_plot['Counts'], labels = Day_plot.index,autopct='%1.1f%%')
axes[1].set_title('Complain logged in different days of the year')

plt.tight_layout()
```



[58]:
```
Month_Day_grouped = Month_Day.groupby(['Month Name','Day␣
↪Name'],as_index=False)['Day No'].count()
Month_Day_grouped_final = Month_Day_grouped.rename(columns={'Day No':'Counts'})
Month_Day_grouped_final.head(15)
```

[58]:

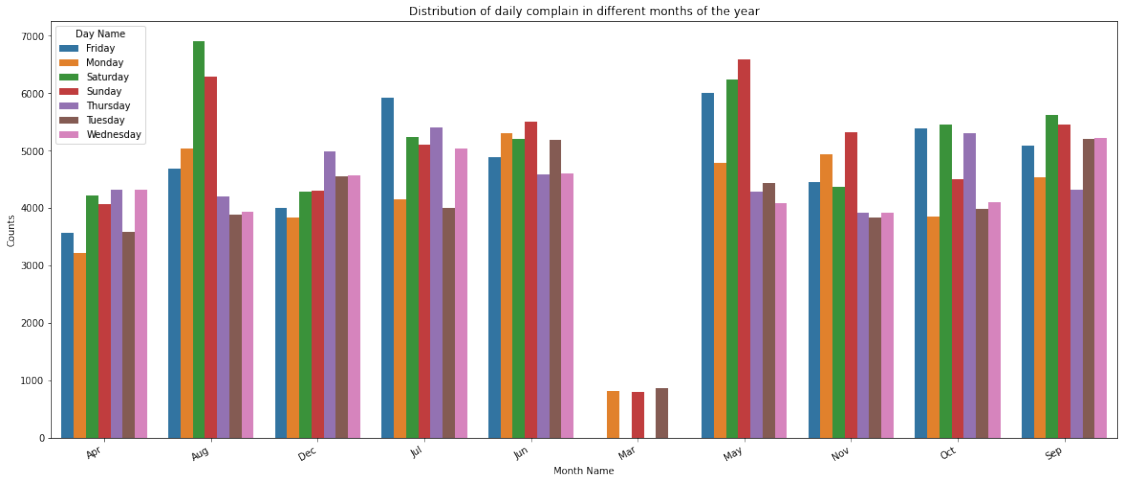
	Month Name	Day Name	Counts
0	Apr	Friday	3565

```
1          Apr     Monday    3222
2          Apr   Saturday    4227
3          Apr     Sunday    4069
4          Apr   Thursday    4323
5          Apr    Tuesday    3586
6          Apr  Wednesday    4313
7          Aug     Friday    4684
8          Aug     Monday    5042
9          Aug   Saturday    6913
10         Aug     Sunday    6293
11         Aug   Thursday    4198
12         Aug    Tuesday    3893
13         Aug  Wednesday    3933
14         Dec     Friday    4000
```

[59]:
```
Month_Day[( (Month_Day['Month Name'] == 'Apr') & (Month_Day['Day Name'] ==␣
 ↪'Monday') )].count()
```

[59]:
```
Date          3222
Month         3222
Day           3222
Month Name    3222
Day No        3222
Day Name      3222
dtype: int64
```

[60]:
```
plt.figure(figsize=(20,8))

month_day_plot = sns.barplot(x=Month_Day_grouped_final['Month Name'],␣
 ↪y=Month_Day_grouped_final['Counts'],
                              hue=Month_Day_grouped_final['Day Name'],␣
 ↪data=Month_Day_grouped_final)
month_day_plot.set_xticklabels(month_day_plot.get_xticklabels(), rotation=30,␣
 ↪ha="right")
plt.title('Distribution of daily complain in different months of the year')
plt.show()
plt.tight_layout()
```



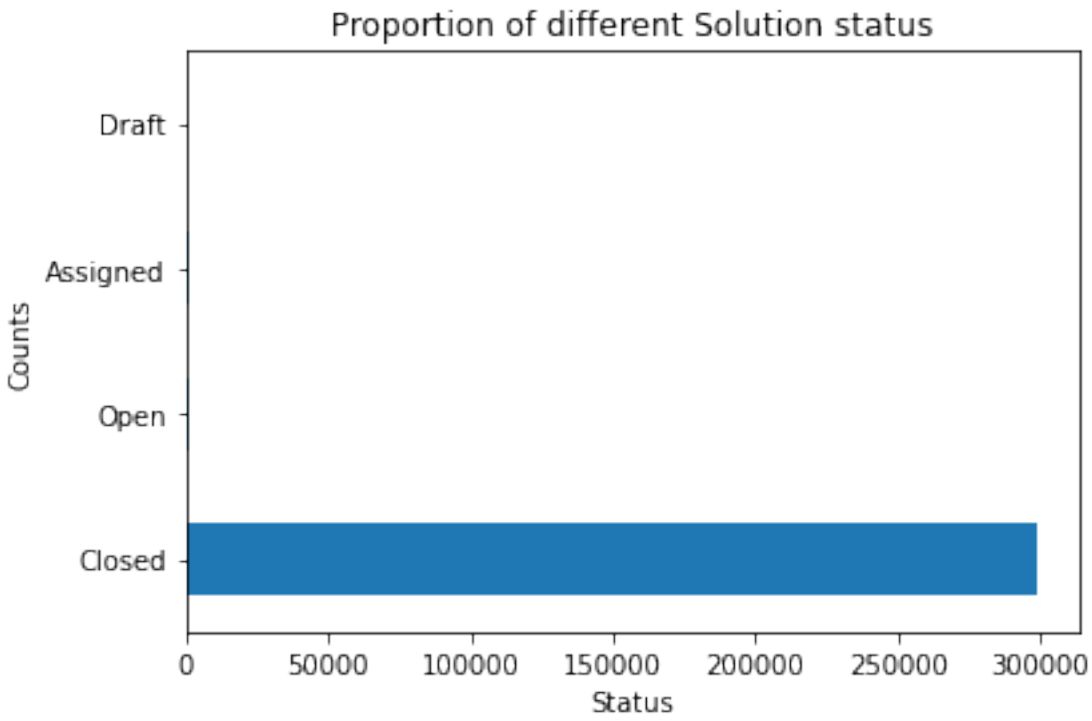
<Figure size 432x288 with 0 Axes>

[61]:
```
Month_Day_grouped[Month_Day_grouped['Month Name'] == 'Mar']
```

[61]:

	Month Name	Day Name	Day No
35	Mar	Monday	807
36	Mar	Sunday	802
37	Mar	Tuesday	862

[62]:
```
data_mod['Status'].value_counts().plot(kind='barh')
plt.xlabel('Status')
plt.ylabel('Counts')
plt.title('Proportion of different Solution status')
plt.show()
plt.tight_layout()
```




```
<Figure size 432x288 with 0 Axes>
```

0.3 4. Order the complaint types based on the average 'Request_Closing_Time', grouping them for different locations

[63]:
```
Complaint_City_AvgTime_grouped = data_place_CType_RCTime.
 ↪groupby(['City','Complaint Type']).agg({'DeltaT(in_hr.)':'mean'})
Complaint_City_AvgTime_grouped = Complaint_City_AvgTime_grouped.rename(
    columns={'DeltaT(in_hr.)':'Avg. Time(Given City, Complaint Type)'})
Complaint_City_AvgTime_grouped = Complaint_City_AvgTime_grouped.transform('Avg.␣
 ↪Time(Given City, Complaint Type)')
Complaint_City_AvgTime_grouped = Complaint_City_AvgTime_grouped.to_frame()
Complaint_City_AvgTime_grouped = Complaint_City_AvgTime_grouped.sort_values(
    ['City','Avg. Time(Given City, Complaint Type)'])

pd.set_option('display.max_rows', None)
pd.set_option('display.max_columns', None)
Complaint_City_AvgTime_grouped
```

[63]:
```
                                        Avg. Time(Given City, Complaint
Type)
```

```
City                Complaint Type
ARVERNE             Drinking
0.240000
                    Vending
0.480000
                    Urinating in Public
0.690000
                    Panhandling
1.030000
                    Noise - Park
1.285000
                    Graffiti
1.530000
                    Noise - House of Worship
1.562727
                    Homeless Encampment
1.812500
                    Noise - Vehicle
1.860000
                    Noise - Street/Sidewalk
1.992759
                    Animal Abuse
2.153158
                    Noise - Commercial
2.285000
                    Illegal Parking
2.316207
                    Blocked Driveway
2.526286
                    Derelict Vehicle
2.968519
                    Disorderly Youth
3.595000
ASTORIA             Panhandling
1.150000
                    Bike/Roller/Skate Chronic
1.740667
                    Noise - House of Worship
2.022632
                    Illegal Fireworks
2.772500
                    Disorderly Youth
2.903333
                    Noise - Park
2.994754
                    Noise - Commercial
3.133039
```

```
                  Noise - Street/Sidewalk
3.450881
                  Noise - Vehicle
3.509020
                  Urinating in Public
4.626667
                  Drinking
4.722571
                  Blocked Driveway
4.816108
                  Illegal Parking
4.833371
                  Homeless Encampment
4.918750
                  Vending
4.935556
                  Animal Abuse
5.000640
                  Traffic
5.410851
                  Posting Advertisement
5.870000
                  Derelict Vehicle
9.689145
                  Graffiti
14.097500
Astoria           Noise - Commercial
3.542069
                  Noise - Street/Sidewalk
3.713333
                  Illegal Parking
4.711362
                  Blocked Driveway
4.915172
                  Derelict Vehicle
6.234167
BAYSIDE           Traffic
1.526667
                  Noise - Street/Sidewalk
1.530667
                  Noise - Vehicle
1.709375
                  Vending
1.880000
                  Drinking
1.900000
                  Noise - Commercial
```

```
2.234500
                    Illegal Parking
2.562763
                    Blocked Driveway
2.562997
                    Homeless Encampment
2.875000
                    Disorderly Youth
2.970000
                    Animal Abuse
3.274865
                    Noise - Park
3.275000
                    Derelict Vehicle
3.360000
                    Noise - House of Worship
3.535000
                    Graffiti
4.553333
BELLEROSE           Noise - Park
1.410000
                    Disorderly Youth
1.850000
                    Noise - House of Worship
2.200000
                    Posting Advertisement
2.260000
                    Noise - Vehicle
2.584000
                    Drinking
3.920000
                    Bike/Roller/Skate Chronic
4.900000
                    Traffic
5.760000
                    Illegal Fireworks
6.670000
                    Noise - Commercial
6.740811
                    Panhandling
7.480000
                    Urinating in Public
7.540000
                    Illegal Parking
8.203019
                    Noise - Street/Sidewalk
9.069231
```

```
                    Blocked Driveway
10.099474
                    Animal Abuse
12.725714
                    Derelict Vehicle
17.167978
                    Homeless Encampment
39.130000
BREEZY POINT        Noise - Street/Sidewalk
1.000000
                    Noise - Vehicle
1.320000
                    Blocked Driveway
1.326667
                    Noise - Commercial
2.540000
                    Animal Abuse
2.615000
                    Drinking
2.630000
                    Illegal Parking
3.942667
                    Derelict Vehicle
7.143333
BRONX               Bike/Roller/Skate Chronic
3.459500
                    Posting Advertisement
3.461176
                    Disorderly Youth
4.238571
                    Noise - House of Worship
4.559494
                    Noise - Commercial
4.697402
                    Noise - Park
4.698556
                    Traffic
4.923606
                    Noise - Street/Sidewalk
5.226292
                    Urinating in Public
5.389804
                    Noise - Vehicle
5.560851
                    Illegal Fireworks
5.607083
                    Drinking
```

```
5.793404
                    Blocked Driveway
6.261773
                    Illegal Parking
6.580888
                    Vending
6.825673
                    Animal Abuse
7.335534
                    Homeless Encampment
7.442186
                    Graffiti
8.898889
                    Derelict Vehicle
9.227623
                    Panhandling
14.214211
BROOKLYN            Illegal Fireworks
2.340000
                    Noise - Commercial
2.986138
                    Noise - House of Worship
3.069765
                    Traffic
3.112959
                    Noise - Park
3.150495
                    Noise - Vehicle
3.283404
                    Noise - Street/Sidewalk
3.296003
                    Posting Advertisement
3.361778
                    Drinking
3.540467
                    Urinating in Public
3.899191
                    Disorderly Youth
4.150833
                    Illegal Parking
4.272241
                    Panhandling
4.316735
                    Blocked Driveway
4.410757
                    Vending
4.528097
```

```
                    Homeless Encampment
4.694912
                    Animal Abuse
4.832427
                    Bike/Roller/Skate Chronic
5.004865
                    Derelict Vehicle
5.947511
                    Graffiti
8.242791
CAMBRIA HEIGHTS     Illegal Fireworks
1.530000
                    Noise - House of Worship
2.640000
                    Noise - Commercial
3.809167
                    Noise - Street/Sidewalk
4.607600
                    Noise - Vehicle
6.917273
                    Blocked Driveway
7.696054
                    Traffic
8.546667
                    Illegal Parking
11.243947
                    Animal Abuse
11.355455
                    Derelict Vehicle
16.110870
                    Homeless Encampment
22.788000
CENTRAL PARK        Noise - Street/Sidewalk
3.266526
                    Illegal Parking
4.595000
COLLEGE POINT       Disorderly Youth
0.600000
                    Homeless Encampment
1.443333
                    Traffic
2.293571
                    Noise - Vehicle
2.650687
                    Noise - Street/Sidewalk
3.016667
                    Illegal Parking
```

```
3.125227
                    Noise - Park
3.180000
                    Blocked Driveway
3.380667
                    Derelict Vehicle
3.518913
                    Noise - Commercial
3.972571
                    Animal Abuse
4.643929
                    Vending
4.660000
                    Graffiti
11.860000
CORONA              Graffiti
0.730000
                    Panhandling
1.170000
                    Posting Advertisement
1.540000
                    Urinating in Public
1.951429
                    Traffic
2.285833
                    Noise - Park
2.320417
                    Noise - Street/Sidewalk
2.364160
                    Noise - Commercial
2.622177
                    Noise - Vehicle
2.660500
                    Disorderly Youth
2.876667
                    Vending
3.101613
                    Blocked Driveway
3.320837
                    Illegal Parking
3.361045
                    Drinking
3.648485
                    Animal Abuse
3.668033
                    Homeless Encampment
3.669474
```

```
                    Noise - House of Worship
3.753333
                    Derelict Vehicle
4.585088
EAST ELMHURST       Bike/Roller/Skate Chronic
0.250000
                    Noise - House of Worship
1.439444
                    Posting Advertisement
1.860000
                    Drinking
1.861111
                    Urinating in Public
2.100000
                    Noise - Vehicle
2.168033
                    Noise - Commercial
2.354000
                    Noise - Street/Sidewalk
2.474673
                    Noise - Park
2.654000
                    Traffic
2.687500
                    Illegal Parking
3.378139
                    Blocked Driveway
3.733274
                    Vending
4.021111
                    Animal Abuse
4.055254
                    Derelict Vehicle
5.687080
                    Homeless Encampment
6.300000
                    Disorderly Youth
6.900000
                    Graffiti
7.650000
ELMHURST            Posting Advertisement
0.730000
                    Disorderly Youth
0.860000
                    Illegal Fireworks
0.980000
                    Noise - House of Worship
```

```
1.886000
                    Noise - Park
2.314412
                    Noise - Street/Sidewalk
2.509554
                    Urinating in Public
2.539000
                    Noise - Vehicle
2.626170
                    Traffic
2.627857
                    Noise - Commercial
2.790123
                    Drinking
3.062308
                    Illegal Parking
3.278196
                    Panhandling
3.300000
                    Blocked Driveway
3.433396
                    Homeless Encampment
3.674687
                    Animal Abuse
3.872105
                    Vending
3.994762
                    Bike/Roller/Skate Chronic
4.625000
                    Derelict Vehicle
4.818333
East Elmhurst       Illegal Parking
5.784615
                    Derelict Vehicle
9.490000
FAR ROCKAWAY        Noise - House of Worship
1.130000
                    Noise - Park
1.504348
                    Urinating in Public
1.510000
                    Noise - Commercial
1.927708
                    Noise - Vehicle
2.180909
                    Traffic
2.385000
```

```
                  Drinking
2.417500
                  Blocked Driveway
2.634648
                  Illegal Parking
2.706441
                  Animal Abuse
2.717865
                  Vending
2.805556
                  Homeless Encampment
3.019286
                  Noise - Street/Sidewalk
3.038382
                  Disorderly Youth
3.370000
                  Derelict Vehicle
3.665615
FLORAL PARK       Noise - Vehicle
1.950000
                  Disorderly Youth
3.260000
                  Noise - Commercial
4.366667
                  Noise - Street/Sidewalk
6.913333
                  Blocked Driveway
7.701500
                  Drinking
8.230000
                  Illegal Parking
9.254063
                  Derelict Vehicle
16.654464
                  Animal Abuse
26.580000
FLUSHING          Illegal Fireworks
0.695000
                  Panhandling
1.150000
                  Urinating in Public
1.226667
                  Graffiti
1.722500
                  Traffic
2.063617
                  Disorderly Youth
```

```
2.145000
                    Vending
2.450000
                    Noise - Street/Sidewalk
2.830533
                    Noise - Commercial
2.845029
                    Noise - Park
2.889310
                    Blocked Driveway
2.951002
                    Illegal Parking
2.982001
                    Homeless Encampment
3.006538
                    Drinking
3.052250
                    Noise - Vehicle
3.359690
                    Animal Abuse
3.557762
                    Noise - House of Worship
3.640000
                    Derelict Vehicle
3.692932
                    Bike/Roller/Skate Chronic
5.733333
                    Posting Advertisement
6.130000
FOREST HILLS        Illegal Fireworks
0.670000
                    Urinating in Public
1.370000
                    Noise - Park
1.539000
                    Noise - Commercial
1.880993
                    Traffic
2.007000
                    Noise - Street/Sidewalk
2.320842
                    Noise - Vehicle
2.383333
                    Vending
2.745000
                    Animal Abuse
3.262889
```

```
                  Graffiti
3.273333
                  Illegal Parking
3.324554
                  Homeless Encampment
3.510556
                  Blocked Driveway
3.715339
                  Derelict Vehicle
3.725962
                  Noise - House of Worship
3.900000
                  Drinking
4.100000
                  Disorderly Youth
4.150000
                  Bike/Roller/Skate Chronic
4.824000
                  Panhandling
5.816000
                  Posting Advertisement
5.866667
FRESH MEADOWS     Panhandling
1.570000
                  Urinating in Public
1.600000
                  Traffic
1.631538
                  Noise - Vehicle
2.145455
                  Noise - Commercial
2.407857
                  Noise - Street/Sidewalk
2.467381
                  Illegal Parking
2.623379
                  Vending
2.630000
                  Animal Abuse
3.279778
                  Noise - Park
3.416250
                  Drinking
3.735000
                  Blocked Driveway
3.973936
                  Derelict Vehicle
```

```
4.511512
                    Homeless Encampment
5.900000
GLEN OAKS           Noise - Park
4.402432
                    Vending
4.843889
                    Traffic
5.550000
                    Noise - Commercial
6.117692
                    Illegal Parking
8.967162
                    Urinating in Public
11.010000
                    Blocked Driveway
11.299667
                    Noise - Vehicle
11.422500
                    Noise - Street/Sidewalk
11.915000
                    Animal Abuse
12.990000
                    Derelict Vehicle
15.245102
HOLLIS              Noise - Street/Sidewalk
2.830732
                    Noise - Vehicle
3.190851
                    Noise - Park
3.512353
                    Traffic
3.819091
                    Disorderly Youth
3.870000
                    Urinating in Public
3.950000
                    Noise - House of Worship
4.052193
                    Homeless Encampment
4.283333
                    Animal Abuse
4.370909
                    Blocked Driveway
4.795117
                    Noise - Commercial
6.715200
```

```
                    Illegal Parking
6.792318
                    Drinking
7.296667
                    Derelict Vehicle
11.565035
HOWARD BEACH        Vending
1.810000
                    Illegal Fireworks
1.846667
                    Drinking
2.007500
                    Bike/Roller/Skate Chronic
2.630000
                    Homeless Encampment
2.646667
                    Noise - Vehicle
3.084000
                    Traffic
3.096667
                    Panhandling
3.300000
                    Noise - Park
3.875000
                    Noise - Street/Sidewalk
3.943333
                    Disorderly Youth
4.190000
                    Blocked Driveway
4.254970
                    Animal Abuse
4.411613
                    Illegal Parking
5.757438
                    Noise - Commercial
5.834922
                    Noise - House of Worship
6.800000
                    Derelict Vehicle
11.476377
Howard Beach        Blocked Driveway
4.030000
JACKSON HEIGHTS     Illegal Fireworks
0.700000
                    Noise - House of Worship
1.105000
                    Posting Advertisement
```

```
1.380000
                Panhandling
1.680000
                Noise - Vehicle
2.211207
                Noise - Street/Sidewalk
2.321198
                Noise - Park
2.418750
                Homeless Encampment
2.612727
                Noise - Commercial
2.956350
                Traffic
3.246923
                Illegal Parking
3.649781
                Vending
3.714615
                Blocked Driveway
3.739313
                Derelict Vehicle
3.768966
                Urinating in Public
3.820000
                Animal Abuse
4.059762
                Bike/Roller/Skate Chronic
4.115000
                Drinking
5.727778
JAMAICA         Panhandling
1.740000
                Illegal Fireworks
2.607500
                Bike/Roller/Skate Chronic
2.915000
                Noise - Park
3.181316
                Noise - Vehicle
3.463775
                Noise - Street/Sidewalk
3.664749
                Noise - Commercial
3.923823
                Drinking
4.412059
```

```
                  Traffic
4.706464
                  Blocked Driveway
4.981122
                  Animal Abuse
5.059127
                  Disorderly Youth
5.077500
                  Illegal Parking
5.079275
                  Urinating in Public
5.108182
                  Noise - House of Worship
5.351538
                  Graffiti
5.410000
                  Posting Advertisement
5.487143
                  Vending
7.512000
                  Derelict Vehicle
7.946527
                  Homeless Encampment
8.077468
KEW GARDENS       Drinking
1.020000
                  Noise - House of Worship
1.160000
                  Homeless Encampment
1.900000
                  Noise - Street/Sidewalk
2.584000
                  Animal Abuse
3.164211
                  Noise - Vehicle
3.625556
                  Traffic
3.793000
                  Noise - Commercial
3.857073
                  Illegal Parking
4.753396
                  Blocked Driveway
6.129553
                  Vending
6.220000
                  Derelict Vehicle
```

```
7.191429
                    Urinating in Public
7.196667
LITTLE NECK         Noise - Park
1.070000
                    Noise - Commercial
1.352763
                    Drinking
1.580000
                    Noise - Street/Sidewalk
1.982500
                    Noise - Vehicle
2.152000
                    Traffic
2.200588
                    Posting Advertisement
2.230000
                    Animal Abuse
2.303333
                    Blocked Driveway
2.417355
                    Illegal Parking
2.850763
                    Urinating in Public
3.080000
                    Derelict Vehicle
3.597049
                    Disorderly Youth
4.355000
LONG ISLAND CITY    Posting Advertisement
0.820000
                    Drinking
3.032857
                    Traffic
3.384583
                    Graffiti
3.505000
                    Panhandling
3.900000
                    Urinating in Public
4.193333
                    Noise - Street/Sidewalk
4.392358
                    Noise - Commercial
4.542130
                    Noise - Vehicle
5.062056
```

```
                  Noise - Park
5.333704
                  Disorderly Youth
5.500000
                  Animal Abuse
6.058667
                  Blocked Driveway
6.076969
                  Bike/Roller/Skate Chronic
6.763333
                  Homeless Encampment
7.015000
                  Illegal Parking
7.467154
                  Vending
9.279333
                  Derelict Vehicle
10.488462
Long Island City  Noise - Street/Sidewalk
2.970385
                  Noise - Commercial
3.357222
                  Blocked Driveway
3.527059
                  Illegal Parking
4.945577
                  Derelict Vehicle
8.680000
MASPETH           Illegal Fireworks
1.620000
                  Drinking
2.324444
                  Urinating in Public
3.695000
                  Traffic
3.754545
                  Disorderly Youth
4.015000
                  Noise - Street/Sidewalk
4.208347
                  Noise - Vehicle
4.601579
                  Vending
4.635000
                  Blocked Driveway
4.815724
                  Noise - Commercial
```

```
4.925577
                    Illegal Parking
5.495492
                    Homeless Encampment
7.183000
                    Animal Abuse
7.278333
                    Derelict Vehicle
7.777995
                    Noise - House of Worship
7.900000
                    Bike/Roller/Skate Chronic
8.840000
                    Noise - Park
11.033333
MIDDLE VILLAGE      Drinking
1.235000
                    Traffic
3.531667
                    Homeless Encampment
4.352000
                    Blocked Driveway
4.368993
                    Noise - Park
4.545000
                    Noise - Vehicle
4.743095
                    Noise - Street/Sidewalk
4.895676
                    Illegal Parking
4.998780
                    Noise - Commercial
5.113000
                    Animal Abuse
6.881364
                    Derelict Vehicle
8.245000
                    Bike/Roller/Skate Chronic
15.680000
NEW HYDE PARK       Animal Abuse
1.920000
                    Noise - Vehicle
3.345000
                    Illegal Parking
7.589286
                    Blocked Driveway
7.738491
```

```
                    Derelict Vehicle
7.802143
NEW YORK            Illegal Fireworks
1.720278
                    Noise - House of Worship
2.305206
                    Disorderly Youth
2.408261
                    Noise - Vehicle
2.621935
                    Traffic
2.649457
                    Noise - Street/Sidewalk
2.733194
                    Noise - Commercial
2.735005
                    Bike/Roller/Skate Chronic
2.892178
                    Urinating in Public
2.893984
                    Noise - Park
2.945041
                    Posting Advertisement
2.955854
                    Drinking
3.057831
                    Vending
3.306084
                    Illegal Parking
3.390036
                    Panhandling
3.474404
                    Blocked Driveway
3.558807
                    Animal Abuse
3.685252
                    Homeless Encampment
3.703297
                    Squeegee
4.047500
                    Derelict Vehicle
4.266071
                    Graffiti
5.063636
OAKLAND GARDENS     Bike/Roller/Skate Chronic
1.115000
                    Disorderly Youth
```

```
1.430000
                    Noise - Street/Sidewalk
1.643684
                    Illegal Parking
2.292928
                    Noise - Vehicle
2.314000
                    Traffic
2.411667
                    Drinking
2.440000
                    Blocked Driveway
2.546667
                    Noise - Park
2.749286
                    Animal Abuse
2.764737
                    Derelict Vehicle
3.719419
                    Vending
3.785000
                    Homeless Encampment
28.650000
OZONE PARK          Illegal Fireworks
0.320000
                    Noise - House of Worship
0.840000
                    Homeless Encampment
1.963333
                    Disorderly Youth
2.207500
                    Noise - Park
2.905556
                    Noise - Vehicle
3.340704
                    Noise - Street/Sidewalk
3.822847
                    Noise - Commercial
3.907391
                    Drinking
3.944211
                    Vending
4.280000
                    Traffic
4.343684
                    Urinating in Public
4.397500
```

```
                    Panhandling
4.582857
                    Blocked Driveway
4.956267
                    Animal Abuse
4.963125
                    Posting Advertisement
4.973333
                    Illegal Parking
5.119742
                    Bike/Roller/Skate Chronic
7.190000
                    Derelict Vehicle
10.677619
QUEENS              Urinating in Public
0.350000
                    Noise - Commercial
1.325000
                    Noise - Vehicle
1.325000
                    Traffic
2.115000
                    Noise - House of Worship
2.600000
                    Illegal Parking
3.417500
                    Noise - Street/Sidewalk
3.655000
                    Blocked Driveway
3.995000
                    Homeless Encampment
7.200000
                    Derelict Vehicle
8.690000
                    Animal in a Park
336.830000
QUEENS VILLAGE      Noise - House of Worship
2.515000
                    Posting Advertisement
3.060000
                    Illegal Fireworks
3.284000
                    Noise - Park
3.525000
                    Drinking
4.680000
                    Noise - Street/Sidewalk
```

```
5.581667
                    Urinating in Public
6.334000
                    Traffic
7.098846
                    Noise - Vehicle
8.879268
                    Panhandling
9.060000
                    Homeless Encampment
9.383333
                    Blocked Driveway
9.538376
                    Illegal Parking
9.935484
                    Noise - Commercial
10.036512
                    Animal Abuse
12.821970
                    Vending
14.600000
                    Derelict Vehicle
16.077216
                    Graffiti
53.330000
REGO PARK           Graffiti
0.950000
                    Homeless Encampment
1.528333
                    Noise - Commercial
2.392785
                    Drinking
2.562500
                    Noise - Street/Sidewalk
2.604912
                    Noise - Vehicle
2.946744
                    Illegal Parking
3.367356
                    Blocked Driveway
3.602733
                    Noise - Park
3.749091
                    Traffic
3.764286
                    Animal Abuse
4.424615
```

```
                  Derelict Vehicle
4.549753
                  Vending
5.113333
                  Urinating in Public
5.600000
                  Noise - House of Worship
9.300000
RICHMOND HILL     Noise - Park
2.242500
                  Graffiti
2.430000
                  Drinking
2.956667
                  Posting Advertisement
3.000000
                  Traffic
3.261429
                  Illegal Fireworks
3.477500
                  Noise - Vehicle
4.076563
                  Noise - Commercial
4.089444
                  Blocked Driveway
5.052434
                  Noise - Street/Sidewalk
5.149195
                  Animal Abuse
5.539687
                  Illegal Parking
5.778579
                  Vending
5.806154
                  Urinating in Public
6.292000
                  Homeless Encampment
8.084643
                  Derelict Vehicle
9.591867
RIDGEWOOD         Posting Advertisement
0.250000
                  Graffiti
0.990000
                  Illegal Fireworks
1.080000
                  Vending
```

```
3.052500
                    Noise - House of Worship
3.075000
                    Bike/Roller/Skate Chronic
3.480000
                    Noise - Park
3.592857
                    Traffic
3.633571
                    Noise - Commercial
3.683417
                    Disorderly Youth
3.996667
                    Blocked Driveway
4.009716
                    Noise - Street/Sidewalk
4.128868
                    Urinating in Public
4.150000
                    Drinking
4.347000
                    Noise - Vehicle
4.349862
                    Illegal Parking
4.435233
                    Homeless Encampment
5.779565
                    Animal Abuse
6.428974
                    Derelict Vehicle
7.576242
ROCKAWAY PARK       Urinating in Public
0.720000
                    Noise - Park
1.025000
                    Homeless Encampment
1.717500
                    Noise - Street/Sidewalk
1.833704
                    Noise - Commercial
2.013492
                    Noise - Vehicle
2.260370
                    Animal Abuse
2.283000
                    Drinking
2.303500
```

```
                Blocked Driveway
2.417429
                Illegal Parking
2.620662
                Derelict Vehicle
2.727778
                Vending
2.945000
                Disorderly Youth
3.427500
                Traffic
3.562857
ROSEDALE        Graffiti
0.160000
                Noise - House of Worship
4.505000
                Drinking
5.505000
                Noise - Park
5.778406
                Noise - Vehicle
5.845200
                Noise - Street/Sidewalk
5.873750
                Vending
6.798125
                Blocked Driveway
7.457773
                Noise - Commercial
7.758800
                Bike/Roller/Skate Chronic
8.525000
                Illegal Parking
10.225487
                Traffic
10.535217
                Derelict Vehicle
14.507548
                Animal Abuse
14.593939
                Homeless Encampment
18.862500
SAINT ALBANS    Noise - Park
0.820000
                Drinking
0.963333
                Disorderly Youth
```

```
1.760000
                    Vending
2.390000
                    Noise - Commercial
3.100345
                    Noise - Street/Sidewalk
3.366582
                    Noise - Vehicle
3.458537
                    Traffic
3.965455
                    Illegal Parking
4.184309
                    Noise - House of Worship
4.650000
                    Blocked Driveway
4.686844
                    Derelict Vehicle
5.900545
                    Urinating in Public
6.510000
                    Animal Abuse
7.372000
                    Homeless Encampment
7.570000
SOUTH OZONE PARK    Illegal Fireworks
0.510000
                    Posting Advertisement
1.290000
                    Urinating in Public
1.695000
                    Homeless Encampment
1.835000
                    Noise - House of Worship
2.160000
                    Disorderly Youth
2.685000
                    Noise - Commercial
3.339571
                    Animal Abuse
3.492000
                    Vending
3.520000
                    Traffic
3.556786
                    Noise - Street/Sidewalk
3.660476
```

```
                    Noise - Vehicle
3.793765
                    Bike/Roller/Skate Chronic
4.060000
                    Blocked Driveway
4.427643
                    Illegal Parking
4.695729
                    Drinking
4.880769
                    Noise - Park
5.707500
                    Derelict Vehicle
10.398687
SOUTH RICHMOND HILL Illegal Fireworks
0.475000
                    Noise - House of Worship
1.983333
                    Disorderly Youth
3.065000
                    Noise - Park
3.605000
                    Noise - Vehicle
3.607407
                    Noise - Commercial
3.873586
                    Noise - Street/Sidewalk
4.121868
                    Animal Abuse
4.366923
                    Blocked Driveway
4.866428
                    Vending
5.267917
                    Homeless Encampment
5.335455
                    Illegal Parking
5.708247
                    Drinking
5.766522
                    Traffic
5.776364
                    Derelict Vehicle
11.877024
                    Bike/Roller/Skate Chronic
30.910000
SPRINGFIELD GARDENS Noise - Park
```

```
1.670000
                    Noise - House of Worship
3.710000
                    Noise - Commercial
3.724722
                    Homeless Encampment
3.778000
                    Noise - Street/Sidewalk
4.217368
                    Urinating in Public
4.790000
                    Drinking
4.846667
                    Noise - Vehicle
5.045476
                    Illegal Fireworks
5.560000
                    Panhandling
6.350000
                    Vending
6.850000
                    Blocked Driveway
9.035725
                    Illegal Parking
9.178067
                    Traffic
10.343636
                    Derelict Vehicle
11.669619
                    Animal Abuse
14.861250
                    Posting Advertisement
19.505000
STATEN ISLAND       Posting Advertisement
1.542117
                    Urinating in Public
2.478571
                    Noise - House of Worship
2.502941
                    Noise - Park
2.933134
                    Noise - Street/Sidewalk
2.969044
                    Noise - Commercial
3.000517
                    Noise - Vehicle
3.237753
```

```
                Drinking
3.493200
                Traffic
3.567500
                Illegal Fireworks
3.735000
                Illegal Parking
3.846005
                Disorderly Youth
3.893913
                Blocked Driveway
4.071195
                Bike/Roller/Skate Chronic
4.078571
                Vending
4.272000
                Panhandling
4.670833
                Animal Abuse
4.969587
                Homeless Encampment
4.980141
                Derelict Vehicle
5.039490
                Graffiti
9.560000
SUNNYSIDE       Graffiti
0.590000
                Bike/Roller/Skate Chronic
1.205000
                Urinating in Public
3.405000
                Disorderly Youth
3.740000
                Drinking
4.606000
                Noise - Vehicle
4.923125
                Traffic
5.951875
                Noise - Street/Sidewalk
6.232000
                Noise - Park
6.464667
                Noise - Commercial
6.622174
                Illegal Parking
```

```
6.665492
                    Blocked Driveway
6.968398
                    Homeless Encampment
7.190000
                    Posting Advertisement
7.270000
                    Vending
9.724000
                    Derelict Vehicle
9.829000
                    Animal Abuse
11.553143
WHITESTONE          Vending
2.330000
                    Traffic
2.720588
                    Animal Abuse
2.808214
                    Bike/Roller/Skate Chronic
3.142500
                    Blocked Driveway
3.153317
                    Illegal Parking
3.176229
                    Disorderly Youth
3.270000
                    Noise - Vehicle
3.363929
                    Derelict Vehicle
3.414361
                    Noise - Street/Sidewalk
3.454848
                    Noise - Park
3.625000
                    Drinking
3.630000
                    Illegal Fireworks
4.370000
                    Noise - Commercial
4.443125
                    Graffiti
8.800000
WOODHAVEN           Bike/Roller/Skate Chronic
1.240000
                    Noise - Park
1.380000
```

```
                Traffic
1.833333
                Vending
2.841667
                Drinking
2.866667
                Noise - House of Worship
3.306667
                Noise - Vehicle
3.403784
                Urinating in Public
3.410000
                Noise - Commercial
3.891600
                Animal Abuse
4.967333
                Noise - Street/Sidewalk
5.237907
                Blocked Driveway
5.522776
                Illegal Parking
5.729018
                Homeless Encampment
7.106667
                Derelict Vehicle
7.450162
WOODSIDE        Disorderly Youth
1.220000
                Illegal Fireworks
2.470000
                Noise - House of Worship
4.740000
                Traffic
4.837436
                Drinking
5.481333
                Noise - Vehicle
5.481524
                Urinating in Public
6.421250
                Blocked Driveway
6.473267
                Noise - Street/Sidewalk
6.623720
                Noise - Commercial
6.687943
                Homeless Encampment
```

```
6.717879
                    Noise - Park
6.751842
                    Illegal Parking
7.245937
                    Vending
7.301333
                    Animal Abuse
8.439710
                    Graffiti
8.993333
                    Derelict Vehicle
9.383887
                    Bike/Roller/Skate Chronic
12.150000
Woodside            Noise - Commercial
2.390000
                    Noise - Street/Sidewalk
3.410000
                    Derelict Vehicle
4.965000
                    Illegal Parking
5.219600
                    Blocked Driveway
6.406364
```

0.3.1 5. Perform a statistical test for the following:

(For the below statements you need to state the Null and Alternate and then provide a statistical test to accept or reject the Null Hypothesis along with the corresponding 'p-value'.)

- Whether the average response time across complaint types is similar or not (overall)
- Are the type of complaint or service requested and location related?

[68]:
```
Complaint_AvgTime = data_place_CType_RCTime.groupby(['Complaint Type']).
↪agg({'DeltaT(in_hr.)':'mean'})
Complaint_AvgTime = pd.DataFrame(Complaint_AvgTime)
Complaint_AvgTime = Complaint_AvgTime.sort_values(['DeltaT(in_hr.)']).
↪reset_index()
Complaint_AvgTime
```

[68]:

	Complaint Type	DeltaT(in_hr.)
0	Posting Advertisement	1.975926
1	Illegal Fireworks	2.761190
2	Noise - Commercial	3.136907
3	Noise - House of Worship	3.193240
4	Noise - Park	3.401706

```
5     Noise - Street/Sidewalk        3.438573
6                     Traffic        3.446291
7            Disorderly Youth        3.558916
8             Noise - Vehicle        3.588570
9         Urinating in Public        3.626486
10  Bike/Roller/Skate Chronic        3.756611
11                   Drinking        3.855354
12                    Vending        4.013619
13                   Squeegee        4.047500
14        Homeless Encampment        4.366029
15                Panhandling        4.372852
16            Illegal Parking        4.486005
17           Blocked Driveway        4.738187
18               Animal Abuse        5.213471
19                    Graffiti        7.151062
20           Derelict Vehicle        7.346105
21           Animal in a Park      336.830000
```

[69]:
```
Tmean_without = float(Complaint_AvgTime[Complaint_AvgTime['Complaint Type']!
 ↪='Animal in a Park'].mean())
print("Without complaint type 'Animal in a Park' ----- ",Tmean_without)
Tmean_with = float(Complaint_AvgTime['DeltaT(in_hr.)'].mean())
print("With complaint type 'Animal in a Park' ----- ",Tmean_with)
```

```
Without complaint type 'Animal in a Park' -----  4.0702191579496825
With complaint type 'Animal in a Park' -----  19.19566374167924
```

[70]:
```
ttest_with, pval_with = stat.ttest_1samp(Complaint_AvgTime['DeltaT(in_hr.)'],␣
 ↪Tmean_with)
print('T-statistic is =',ttest_with)
print('p value is =',np.around(pval_with))
```

```
T-statistic is = 0.0
p value is = 1.0
```

[71]:
```
if (pval_with<0.05):
    print('Null hypothesis is rejected since p value ({}) is less than 0.05'.
 ↪format(np.around(pval_with,decimals=2)))
else:
    print('Null hypothesis is accepted since p value ({}) is greater than 0.05'.
 ↪format(np.around(pval_with,decimals=2)))
```

```
Null hypothesis is accepted since p value (1.0) is greater than 0.05
```

[72]:
```
Complaint_AvgTime_without = Complaint_AvgTime.
 ↪drop([len(Complaint_AvgTime)-1],axis=0)
Complaint_AvgTime_without
```

[72]:

	Complaint Type	DeltaT(in_hr.)
0	Posting Advertisement	1.975926
1	Illegal Fireworks	2.761190
2	Noise - Commercial	3.136907
3	Noise - House of Worship	3.193240
4	Noise - Park	3.401706
5	Noise - Street/Sidewalk	3.438573
6	Traffic	3.446291
7	Disorderly Youth	3.558916
8	Noise - Vehicle	3.588570
9	Urinating in Public	3.626486
10	Bike/Roller/Skate Chronic	3.756611
11	Drinking	3.855354
12	Vending	4.013619
13	Squeegee	4.047500
14	Homeless Encampment	4.366029
15	Panhandling	4.372852
16	Illegal Parking	4.486005
17	Blocked Driveway	4.738187
18	Animal Abuse	5.213471
19	Graffiti	7.151062
20	Derelict Vehicle	7.346105

[73]:
```
ttest_without, pval_without = stat.
 ↪ttest_1samp(Complaint_AvgTime_without['DeltaT(in_hr.)'], Tmean_without)
print('T-statistic is =',ttest_without)
print('p value is =',np.around(pval_without,decimals=8))
```

```
T-statistic is = 3.210630969931075e-15
p value is = 1.0
```

[74]:
```
if (pval_without<0.05):
    print('Null hypothesis is rejected since p value ({}) is less than 0.05'.
 ↪format(np.around(pval_without,decimals=2)))
else:
    print('Null hypothesis is accepted since p value ({}) is greater than 0.05'.
 ↪format(np.around(pval_without,decimals=2)))
```

```
Null hypothesis is accepted since p value (1.0) is greater than 0.05
```

[75]:
```
sample1 = Complaint_AvgTime.sample(frac=.5)
sample1
```

[75]:

	Complaint Type	DeltaT(in_hr.)
10	Bike/Roller/Skate Chronic	3.756611
19	Graffiti	7.151062
12	Vending	4.013619

```
6                     Traffic        3.446291
18                Animal Abuse        5.213471
13                    Squeegee        4.047500
15                 Panhandling        4.372852
11                    Drinking        3.855354
8              Noise - Vehicle        3.588570
3    Noise - House of Worship         3.193240
0       Posting Advertisement        1.975926
```

[76]:
```
sample2 = Complaint_AvgTime.drop(sample1.index)
sample2
```

[76]:
```
              Complaint Type  DeltaT(in_hr.)
1          Illegal Fireworks        2.761190
2        Noise - Commercial         3.136907
4               Noise - Park        3.401706
5   Noise - Street/Sidewalk         3.438573
7          Disorderly Youth         3.558916
9       Urinating in Public         3.626486
14      Homeless Encampment         4.366029
16          Illegal Parking         4.486005
17         Blocked Driveway         4.738187
20         Derelict Vehicle         7.346105
21         Animal in a Park       336.830000
```

[77]:
```
print('Mean of 1st sample =',np.around(float(sample1['DeltaT(in_hr.)'].
 ↪mean()),decimals=2))
print('Standard dev. of 1st sample =',np.around(float(sample1['DeltaT(in_hr.)'].
 ↪std()),decimals=2))
print('Mean of 2nd sample =',np.around(float(sample2['DeltaT(in_hr.)'].
 ↪mean()),decimals=2))
print('Standard dev. of 2nd sample =',np.around(float(sample2['DeltaT(in_hr.)'].
 ↪std()),decimals=2))
```

```
Mean of 1st sample = 4.06
Standard dev. of 1st sample = 1.3
Mean of 2nd sample = 34.34
Standard dev. of 2nd sample = 100.33
```

[78]:
```
ttest_2sp, p_val = stat.ttest_ind(sample1['DeltaT(in_hr.
 ↪)'],sample2['DeltaT(in_hr.)'])
print('T-statistic is =',ttest_2sp)
print('p value is =',np.around(p_val,decimals=2))
```

```
T-statistic is = -1.0008368620559398
p value is = 0.33
```

[79]:
```
if (p_val<0.05):
    print('Null hypothesis is rejected since p value ({}) is less than 0.05'.
 ↪format(np.around(p_val,decimals=2)))
else:
    print('Null hypothesis is accepted since p value ({}) is greater than 0.05'.
 ↪format(np.around(p_val,decimals=2)))
```

```
Null hypothesis is accepted since p value (0.33) is greater than 0.05
```

[80]:
```
sample1_anova = Complaint_AvgTime.sample(frac=1/3)
sample1_anova
```

[80]:

	Complaint Type	DeltaT(in_hr.)
18	Animal Abuse	5.213471
3	Noise - House of Worship	3.193240
14	Homeless Encampment	4.366029
20	Derelict Vehicle	7.346105
8	Noise - Vehicle	3.588570
21	Animal in a Park	336.830000
13	Squeegee	4.047500

[81]:
```
rest_data = Complaint_AvgTime.drop(sample1_anova.index)
rest_data
```

[81]:

	Complaint Type	DeltaT(in_hr.)
0	Posting Advertisement	1.975926
1	Illegal Fireworks	2.761190
2	Noise - Commercial	3.136907
4	Noise - Park	3.401706
5	Noise - Street/Sidewalk	3.438573
6	Traffic	3.446291
7	Disorderly Youth	3.558916
9	Urinating in Public	3.626486
10	Bike/Roller/Skate Chronic	3.756611
11	Drinking	3.855354
12	Vending	4.013619
15	Panhandling	4.372852
16	Illegal Parking	4.486005
17	Blocked Driveway	4.738187
19	Graffiti	7.151062

[82]:
```
sample2_anova = rest_data.sample(frac=1/2)
sample2_anova
```

[82]:

	Complaint Type	DeltaT(in_hr.)
1	Illegal Fireworks	2.761190
0	Posting Advertisement	1.975926

```
6                 Traffic        3.446291
9     Urinating in Public        3.626486
7        Disorderly Youth        3.558916
4            Noise - Park        3.401706
19               Graffiti        7.151062
15            Panhandling        4.372852
```

[84]:
```
sample3_anova = rest_data.drop(sample2_anova.index)
sample3_anova
```

[84]:
```
               Complaint Type  DeltaT(in_hr.)
2          Noise - Commercial        3.136907
5     Noise - Street/Sidewalk        3.438573
10  Bike/Roller/Skate Chronic        3.756611
11                   Drinking        3.855354
12                    Vending        4.013619
16            Illegal Parking        4.486005
17           Blocked Driveway        4.738187
```

[85]:
```
print('Mean of 1st sample =',np.around(float(sample1_anova['DeltaT(in_hr.)'].
 ↪mean()),decimals=2))
print('Standard dev. of 1st sample =',np.
 ↪around(float(sample1_anova['DeltaT(in_hr.)'].std()),decimals=2))
print('Mean of 2nd sample =',np.around(float(sample2_anova['DeltaT(in_hr.)'].
 ↪mean()),decimals=2))
print('Standard dev. of 2nd sample =',np.
 ↪around(float(sample2_anova['DeltaT(in_hr.)'].std()),decimals=2))
print('Mean of 3rd sample =',np.around(float(sample3_anova['DeltaT(in_hr.)'].
 ↪mean()),decimals=2))
print('Standard dev. of 3rd sample =',np.
 ↪around(float(sample3_anova['DeltaT(in_hr.)'].std()),decimals=2))
```

```
Mean of 1st sample = 52.08
Standard dev. of 1st sample = 125.57
Mean of 2nd sample = 3.79
Standard dev. of 2nd sample = 1.53
Mean of 3rd sample = 3.92
Standard dev. of 3rd sample = 0.56
```

[86]:
```
f_val,p_val = stat.shapiro(sample1_anova['DeltaT(in_hr.)'])
print('F-statistic is =',f_val)
print('p value is =',np.around(p_val,decimals=2))
```

```
F-statistic is = 0.46257686614990234
p value is = 0.0
```

[87]:
```
f_val,p_val = stat.shapiro(sample2_anova['DeltaT(in_hr.)'])
print('F-statistic is =',f_val)
print('p value is =',np.around(p_val,decimals=2))
```

```
F-statistic is = 0.8321077823638916
p value is = 0.06
```

[88]:
```
f_val,p_val = stat.shapiro(sample3_anova['DeltaT(in_hr.)'])
print('F-statistic is =',f_val)
print('p value is =',np.around(p_val,decimals=2))
```

```
F-statistic is = 0.974372386932373
p value is = 0.93
```

[89]:
```
f_val,p_val = stat.levene(sample1_anova['DeltaT(in_hr.
↪)'],sample2_anova['DeltaT(in_hr.)'],sample3_anova['DeltaT(in_hr.)'])
print('F-statistic is =',f_val)
print('p value is =',np.around(p_val,decimals=2))
```

```
F-statistic is = 1.0953335331679992
p value is = 0.35
```

[ ]:
```

```