call-list

February 2, 2024

```
Data cleaning in pandas
[1]: # Import the pandas library
     import pandas as pd
[2]: # Read the CSV file into a DataFrame and assign it to the variable 'df'
     df = pd.read_csv("E:\PYTHON\Customer call list\Customer Call List.csv")
    <>:2: SyntaxWarning: invalid escape sequence '\P'
    <>:2: SyntaxWarning: invalid escape sequence '\P'
    C:\Users\Admin\AppData\Local\Temp\ipykernel_9896\2024009910.py:2: SyntaxWarning:
    invalid escape sequence '\P'
      df = pd.read_csv("E:\PYTHON\Customer call list\Customer Call List.csv")
[3]: df
[3]:
         CustomerID First_Name
                                    Last_Name
                                                Phone_Number
                1001
                          Frodo
                                      Baggins
                                                123-545-5421
     0
     1
                                         Nadir
                1002
                            Abed
                                                123/643/9775
     2
                                        /White
                1003
                         Walter
                                                  7066950392
     3
                1004
                         Dwight
                                       Schrute
                                                123-543-2345
     4
                1005
                                          Snow
                                                876 | 678 | 3469
                             Jon
     5
                1006
                                      Swanson
                                                304-762-2467
                            Ron
     6
                1007
                            Jeff
                                                          NaN
                                        Winger
     7
                1008
                       Sherlock
                                        Holmes
                                                876 | 678 | 3469
     8
                1009
                        Gandalf
                                           NaN
                                                          N/a
     9
                1010
                           Peter
                                                123-545-5421
                                        Parker
     10
                1011
                        Samwise
                                        Gamgee
                                                          NaN
     11
                1012
                           Harry
                                    ...Potter
                                                7066950392
     12
                1013
                             Don
                                        Draper
                                                123-543-2345
     13
                1014
                         Leslie
                                         Knope
                                                876 | 678 | 3469
     14
                1015
                            Toby
                                  Flenderson_
                                                304-762-2467
     15
                1016
                            Ron
                                      Weasley
                                                123-545-5421
     16
                1017
                       Michael
                                         Scott
                                                123/643/9775
     17
                1018
                           Clark
                                                  7066950392
                                          Kent
     18
                1019
                           Creed
                                        Braton
                                                          N/a
     19
                1020
                         Anakin
                                    Skywalker
                                                876 | 678 | 3469
     20
                1020
                                    Skywalker
                         Anakin
                                                876 | 678 | 3469
```

	Address	Paying Customer	Do_Not_Contact	\
0	123 Shire Lane, Shire	Yes	No	
1	93 West Main Street	No	Yes	
2	298 Drugs Driveway	N	NaN	
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y	
4	123 Dragons Road	Y	No	
5	768 City Parkway	Yes	Yes	
6	1209 South Street	No	No	
7	98 Clue Drive	N	No	
8	123 Middle Earth	Yes	NaN	
9	25th Main Street, New York	Yes	No	
10	612 Shire Lane, Shire	Yes	No	
11	2394 Hogwarts Avenue	Y	NaN	
12	2039 Main Street	Yes	N	
13	343 City Parkway	Yes	No	
14	214 HR Avenue	N	No	
15	2395 Hogwarts Avenue	No	N	
16	121 Paper Avenue, Pennsylvania	Yes	No	
17	3498 Super Lane	Y	NaN	
18	N/a	N/a	Yes	
19	910 Tatooine Road, Tatooine	Yes	N	
20	910 Tatooine Road, Tatooine	Yes	N	
	Not_Useful_Column			
_	_			

	Not_Useful_Column
0	True
1	False
2	True
3	True
4	True
5	True
6	False
7	False
8	False
9	True
10	True
11	True
12	False
13	False
14	False
15	False
16	False
17	True
18	True
19	True
20	True

Remove duplicates

```
df = df.drop_duplicates()
[5]: df
         CustomerID First_Name
[5]:
                                     Last_Name
                                                 Phone_Number
     0
                1001
                           Frodo
                                       Baggins
                                                 123-545-5421
                1002
     1
                            Abed
                                          Nadir
                                                 123/643/9775
     2
                1003
                          Walter
                                         /White
                                                    7066950392
     3
                1004
                                       Schrute
                          Dwight
                                                 123-543-2345
     4
                                           {\tt Snow}
                1005
                              Jon
                                                 876 | 678 | 3469
     5
                1006
                             Ron
                                       Swanson
                                                 304-762-2467
     6
                1007
                            Jeff
                                         Winger
                                                           NaN
     7
                1008
                        Sherlock
                                         Holmes
                                                 876 | 678 | 3469
     8
                1009
                         Gandalf
                                                           N/a
                                            NaN
     9
                1010
                                                 123-545-5421
                           Peter
                                         Parker
     10
                1011
                         Samwise
                                         Gamgee
                                                           NaN
     11
                1012
                           Harry
                                     ...Potter
                                                  7066950392
     12
                1013
                                                 123-543-2345
                             Don
                                         Draper
     13
                1014
                          Leslie
                                          Knope
                                                 876 | 678 | 3469
     14
                1015
                            Toby
                                   Flenderson_
                                                  304-762-2467
     15
                1016
                             Ron
                                       Weasley
                                                 123-545-5421
     16
                1017
                        Michael
                                          Scott
                                                 123/643/9775
                                                    7066950392
     17
                1018
                           Clark
                                           Kent
                1019
                           Creed
                                                           N/a
     18
                                         Braton
     19
                1020
                          Anakin
                                     Skywalker
                                                 876 | 678 | 3469
                                           Address Paying Customer Do_Not_Contact
     0
                           123 Shire Lane, Shire
                                                                 Yes
                                                                                   No
     1
                             93 West Main Street
                                                                  No
                                                                                  Yes
     2
                               298 Drugs Driveway
                                                                   N
                                                                                  NaN
     3
         980 Paper Avenue, Pennsylvania, 18503
                                                                                    Y
                                                                 Yes
     4
                                                                   Y
                                 123 Dragons Road
                                                                                   No
     5
                                 768 City Parkway
                                                                 Yes
                                                                                  Yes
     6
                                1209 South Street
                                                                  No
                                                                                   No
     7
                                    98 Clue Drive
                                                                   N
                                                                                   No
                                 123 Middle Earth
     8
                                                                 Yes
                                                                                  NaN
     9
                      25th Main Street, New York
                                                                                   No
                                                                 Yes
                           612 Shire Lane, Shire
     10
                                                                 Yes
                                                                                   No
     11
                            2394 Hogwarts Avenue
                                                                   Y
                                                                                  NaN
                                 2039 Main Street
     12
                                                                                    N
                                                                 Yes
     13
                                 343 City Parkway
                                                                 Yes
                                                                                   No
     14
                                    214 HR Avenue
                                                                   N
                                                                                   No
     15
                            2395 Hogwarts Avenue
                                                                  No
                                                                                    N
     16
                 121 Paper Avenue, Pennsylvania
                                                                                   No
                                                                 Yes
                                                                   Y
     17
                                  3498 Super Lane
                                                                                  NaN
```

[4]: # Remove duplicate rows from the DataFrame 'df'

```
N/a
                                                               N/a
     18
                                                                               Yes
     19
                    910 Tatooine Road, Tatooine
                                                               Yes
                                                                                  N
         Not_Useful_Column
     0
                       True
                      False
     1
     2
                       True
     3
                       True
     4
                       True
     5
                       True
                      False
     6
     7
                      False
     8
                      False
     9
                       True
     10
                       True
                       True
     11
     12
                      False
     13
                      False
     14
                      False
     15
                      False
     16
                      False
     17
                       True
     18
                       True
     19
                       True
    Droping column
[6]: # Drop the column named "Not_Useful_Column" from the DataFrame 'df'
     df = df.drop(columns="Not_Useful_Column")
[7]: df
[7]:
         CustomerID First_Name
                                    Last_Name Phone_Number
                1001
                                               123-545-5421
                          Frodo
                                      Baggins
     1
                1002
                            Abed
                                        Nadir 123/643/9775
     2
                1003
                         Walter
                                       /White
                                                   7066950392
     3
                1004
                         Dwight
                                      Schrute
                                               123-543-2345
     4
                1005
                             Jon
                                          Snow
                                                876 | 678 | 3469
     5
                                                304-762-2467
                1006
                            Ron
                                      Swanson
     6
                1007
                            Jeff
                                        Winger
                                                          NaN
     7
                1008
                       Sherlock
                                       Holmes
                                                876 | 678 | 3469
     8
                1009
                        Gandalf
                                           NaN
                                                          N/a
     9
                1010
                          Peter
                                       Parker
                                                123-545-5421
     10
                1011
                        Samwise
                                        Gamgee
                                                          NaN
     11
                1012
                                    ...Potter
                                                7066950392
                          Harry
     12
                1013
                            Don
                                        Draper
                                                123-543-2345
```

13	1014	Leslie	Knope	876 678 3469
14	1015	Toby	Flenderson_	304-762-2467
15	1016	Ron	Weasley	123-545-5421
16	1017	Michael	Scott	123/643/9775
17	1018	Clark	Kent	7066950392
18	1019	Creed	Braton	N/a
19	1020	Anakin	Skywalker	876 678 3469

Address Paying Customer Do_Not_Contact 123 Shire Lane, Shire 0 Yes 1 93 West Main Street No Yes 2 298 Drugs Driveway N NaN 3 980 Paper Avenue, Pennsylvania, 18503 Yes Y 4 123 Dragons Road Y No 5 768 City Parkway Yes Yes 6 1209 South Street No No 7 98 Clue Drive N No 8 123 Middle Earth Yes NaN 9 25th Main Street, New York Yes No 10 612 Shire Lane, Shire Yes No 11 2394 Hogwarts Avenue Y NaN 12 2039 Main Street Yes N 13 343 City Parkway Yes No 14 214 HR Avenue N No 15 2395 Hogwarts Avenue No N 16 121 Paper Avenue, Pennsylvania Yes No 17 3498 Super Lane Y NaN18 N/a N/a Yes 19 910 Tatooine Road, Tatooine Yes N

Using strip to Remove Unnecessary Strings in Last Name Column

```
[8]: # Strip specified characters from the 'Last_Name' column in the DataFrame 'df'

#df["Last_Name"] = df["Last_Name"].str.lstrip("...")

#df["Last_Name"] = df["Last_Name"].str.lstrip("/")

#df["Last_Name"] = df["Last_Name"].str.rstrip("_")

df['Last_Name'] = df['Last_Name'].str.strip("123./_")
```

[9]: df

[9]:	${\tt CustomerID}$	First_Name	Last_Name	Phone_Number	,
0	1001	Frodo	Baggins	123-545-5421	
1	1002	Abed	Nadir	123/643/9775	
2	1003	Walter	White	7066950392	
3	1004	Dwight	Schrute	123-543-2345	
4	1005	Jon	Snow	876 678 3469	
5	1006	Ron	Swanson	304-762-2467	

\

6	1007	Jeff	Winger	NaN
7	1008	Sherlock	Holmes	876 678 3469
8	1009	Gandalf	NaN	N/a
9	1010	Peter	Parker	123-545-5421
10	1011	Samwise	${\tt Gamgee}$	NaN
11	1012	Harry	Potter	7066950392
12	1013	Don	Draper	123-543-2345
13	1014	Leslie	Knope	876 678 3469
14	1015	Toby	Flenderson	304-762-2467
15	1016	Ron	Weasley	123-545-5421
16	1017	Michael	Scott	123/643/9775
17	1018	Clark	Kent	7066950392
18	1019	Creed	Braton	N/a
19	1020	Anakin	Skywalker	876 678 3469

Address Paying Customer Do_Not_Contact

0	123 Shire Lane, Shire	Yes	No
1	93 West Main Street	No	Yes
2	298 Drugs Driveway	N	NaN
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	123 Dragons Road	Y	No
5	768 City Parkway	Yes	Yes
6	1209 South Street	No	No
7	98 Clue Drive	N	No
8	123 Middle Earth	Yes	NaN
9	25th Main Street, New York	Yes	No
10	612 Shire Lane, Shire	Yes	No
11	2394 Hogwarts Avenue	Y	NaN
12	2039 Main Street	Yes	N
13	343 City Parkway	Yes	No
14	214 HR Avenue	N	No
15	2395 Hogwarts Avenue	No	N
16	121 Paper Avenue, Pennsylvania	Yes	No
17	3498 Super Lane	Y	NaN
18	N/a	N/a	Yes
19	910 Tatooine Road, Tatooine	Yes	N

Using strip to Remove Unnecessary Strings in Phone Number Column

[10]: df

[10]:	CustomerID	First_Name	Last_Name	Phone_Number	\
0	1001	Frodo	Baggins	123-545-5421	
1	1002	Abed	Nadir	123/643/9775	
2	1003	Walter	White	7066950392	
3	1004	Dwight	Schrute	123-543-2345	
4	1005	.Ion	Snow	876167813469	

```
5
                 1006
                             Ron
                                      Swanson
                                                304-762-2467
      6
                 1007
                             Jeff
                                       Winger
                                                         NaN
      7
                 1008
                        Sherlock
                                       Holmes
                                                876 | 678 | 3469
      8
                 1009
                         Gandalf
                                          NaN
                                                          N/a
      9
                 1010
                           Peter
                                       Parker
                                                123-545-5421
      10
                 1011
                         Samwise
                                                         NaN
                                       Gamgee
                 1012
                                                  7066950392
      11
                           Harry
                                       Potter
      12
                 1013
                             Don
                                       Draper
                                                123-543-2345
      13
                 1014
                          Leslie
                                        Knope
                                                876 | 678 | 3469
      14
                 1015
                            Toby
                                   Flenderson
                                                304-762-2467
      15
                 1016
                             Ron
                                      Weasley
                                                123-545-5421
      16
                 1017
                        Michael
                                        Scott
                                                123/643/9775
      17
                 1018
                           Clark
                                         Kent
                                                  7066950392
      18
                 1019
                           Creed
                                       Braton
                                                         N/a
      19
                 1020
                                    Skywalker 876|678|3469
                          Anakin
                                          Address Paying Customer Do_Not_Contact
      0
                           123 Shire Lane, Shire
                                                                Yes
      1
                              93 West Main Street
                                                                 No
                                                                                Yes
      2
                               298 Drugs Driveway
                                                                  N
                                                                                NaN
      3
          980 Paper Avenue, Pennsylvania, 18503
                                                                Yes
                                                                                  Y
      4
                                 123 Dragons Road
                                                                  Y
                                                                                 No
      5
                                 768 City Parkway
                                                                                Yes
                                                                Yes
      6
                                1209 South Street
                                                                 No
                                                                                 No
      7
                                    98 Clue Drive
                                                                  N
                                                                                 No
      8
                                 123 Middle Earth
                                                                Yes
                                                                                NaN
                      25th Main Street, New York
      9
                                                                Yes
                                                                                 No
      10
                           612 Shire Lane, Shire
                                                                                 No
                                                                Yes
      11
                            2394 Hogwarts Avenue
                                                                  Y
                                                                                NaN
      12
                                 2039 Main Street
                                                                Yes
                                                                                  N
      13
                                 343 City Parkway
                                                                Yes
                                                                                 No
      14
                                    214 HR Avenue
                                                                  N
                                                                                 No
      15
                             2395 Hogwarts Avenue
                                                                                  N
                                                                 No
      16
                  121 Paper Avenue, Pennsylvania
                                                                Yes
                                                                                 No
      17
                                  3498 Super Lane
                                                                  Y
                                                                                NaN
      18
                                               N/a
                                                                N/a
                                                                                Yes
      19
                     910 Tatooine Road, Tatooine
                                                                                  N
                                                                Yes
[11]: #Phone Number cleaning
      df['Phone_Number'] = df['Phone_Number'].str.replace(r'\D', '', regex=True)
       →Remove non-numeric characters
      df['Phone_Number'] = df['Phone_Number'].str[-10:] # Keep the last 10 digits
      df['Phone_Number'] = df['Phone_Number'].str[:3] + '-' + df['Phone_Number'].
        str[3:6] + '-' + df['Phone Number'].str[6:] # Format as XXX-XXX-XXXX
```

[12]: df['Phone_Number']

```
[12]: 0
            123-545-5421
            123-643-9775
      1
      2
            706-695-0392
      3
            123-543-2345
      4
            876-678-3469
      5
            304-762-2467
      6
                      {\tt NaN}
      7
            876-678-3469
      8
      9
            123-545-5421
      10
                      NaN
      11
            706-695-0392
      12
            123-543-2345
      13
            876-678-3469
      14
            304-762-2467
      15
            123-545-5421
      16
            123-643-9775
      17
            706-695-0392
      18
      19
            876-678-3469
      Name: Phone_Number, dtype: object
[13]: # Replace NaN values with blank (empty string) in the 'Phone_Number' column
      df['Phone_Number'] = df['Phone_Number'].fillna('')
[14]: df['Phone_Number']
[14]: 0
            123-545-5421
      1
            123-643-9775
      2
            706-695-0392
      3
            123-543-2345
      4
            876-678-3469
      5
            304-762-2467
      6
      7
            876-678-3469
      8
      9
            123-545-5421
      10
            706-695-0392
      11
      12
            123-543-2345
      13
            876-678-3469
      14
            304-762-2467
      15
            123-545-5421
      16
            123-643-9775
      17
            706-695-0392
      18
      19
            876-678-3469
```

Name: Phone_Number, dtype: object

```
[15]: # Remove occurrences of '--' in the 'Phone Number' column
      df['Phone_Number'] = df['Phone_Number'].str.replace('--', '')
[16]: df
[16]:
          CustomerID First_Name
                                                Phone_Number
                                    Last_Name
      0
                 1001
                           Frodo
                                      Baggins
                                                123-545-5421
      1
                 1002
                             Abed
                                        Nadir
                                                123-643-9775
      2
                 1003
                          Walter
                                        White
                                                706-695-0392
      3
                 1004
                          Dwight
                                      Schrute
                                                123-543-2345
      4
                 1005
                              Jon
                                         Snow
                                                876-678-3469
                                                304-762-2467
      5
                 1006
                             Ron
                                      Swanson
      6
                 1007
                             Jeff
                                       Winger
      7
                 1008
                        Sherlock
                                       Holmes
                                                876-678-3469
      8
                 1009
                         Gandalf
                                           NaN
      9
                 1010
                            Peter
                                       Parker
                                                123-545-5421
      10
                 1011
                         Samwise
                                       Gamgee
      11
                 1012
                                       Potter
                                                706-695-0392
                           Harry
      12
                 1013
                              Don
                                       Draper
                                                123-543-2345
      13
                 1014
                          Leslie
                                        Knope
                                                876-678-3469
      14
                 1015
                             Toby
                                   Flenderson
                                                304-762-2467
      15
                 1016
                             Ron
                                      Weasley
                                                123-545-5421
      16
                 1017
                        Michael
                                         Scott
                                                123-643-9775
      17
                 1018
                            Clark
                                         Kent
                                                706-695-0392
                            Creed
      18
                 1019
                                       Braton
      19
                 1020
                          Anakin
                                    Skywalker
                                                876-678-3469
                                           Address Paying Customer Do Not Contact
      0
                           123 Shire Lane, Shire
                                                                Yes
                                                                                 No
      1
                              93 West Main Street
                                                                                Yes
                                                                 No
      2
                               298 Drugs Driveway
                                                                  Ν
                                                                                NaN
      3
          980 Paper Avenue, Pennsylvania, 18503
                                                                                  Y
                                                                Yes
      4
                                 123 Dragons Road
                                                                  Y
                                                                                 No
      5
                                 768 City Parkway
                                                                Yes
                                                                                Yes
      6
                                1209 South Street
                                                                 No
                                                                                 No
      7
                                    98 Clue Drive
                                                                  N
                                                                                 No
      8
                                 123 Middle Earth
                                                                Yes
                                                                                NaN
      9
                      25th Main Street, New York
                                                                Yes
                                                                                 No
                            612 Shire Lane, Shire
      10
                                                                Yes
                                                                                 No
      11
                             2394 Hogwarts Avenue
                                                                  Y
                                                                                NaN
      12
                                 2039 Main Street
                                                                Yes
                                                                                  N
      13
                                 343 City Parkway
                                                                Yes
                                                                                 No
      14
                                    214 HR Avenue
                                                                  N
                                                                                 No
      15
                             2395 Hogwarts Avenue
                                                                 No
                                                                                  N
      16
                  121 Paper Avenue, Pennsylvania
                                                                Yes
                                                                                 No
```

```
      17
      3498 Super Lane
      Y
      NaN

      18
      N/a
      N/a
      N/a
      Yes

      19
      910 Tatooine Road, Tatooine
      Yes
      N
```

Spliting Address column

```
[17]: 0
                             123 Shire Lane, Shire
      1
                               93 West Main Street
      2
                                298 Drugs Driveway
      3
            980 Paper Avenue, Pennsylvania, 18503
      4
                                  123 Dragons Road
      5
                                  768 City Parkway
      6
                                 1209 South Street
      7
                                     98 Clue Drive
      8
                                  123 Middle Earth
      9
                        25th Main Street, New York
      10
                             612 Shire Lane, Shire
                              2394 Hogwarts Avenue
      11
      12
                                  2039 Main Street
      13
                                  343 City Parkway
      14
                                     214 HR Avenue
      15
                              2395 Hogwarts Avenue
      16
                   121 Paper Avenue, Pennsylvania
      17
                                   3498 Super Lane
      18
                                                N/a
      19
                       910 Tatooine Road, Tatooine
      Name: Address, dtype: object
```

[40] . 46

[18]: df

```
[18]:
          CustomerID First_Name
                                    Last_Name
                                               Phone_Number
      0
                 1001
                            Frodo
                                      Baggins
                                                123-545-5421
      1
                 1002
                             Abed
                                        Nadir
                                                123-643-9775
      2
                 1003
                                               706-695-0392
                          Walter
                                        White
      3
                 1004
                          Dwight
                                      Schrute
                                                123-543-2345
      4
                 1005
                              Jon
                                          Snow
                                                876-678-3469
      5
                 1006
                              Ron
                                      Swanson
                                                304-762-2467
      6
                 1007
                             Jeff
                                       Winger
      7
                        Sherlock
                                       Holmes
                 1008
                                                876-678-3469
      8
                 1009
                         Gandalf
                                           NaN
      9
                 1010
                            Peter
                                       Parker
                                                123-545-5421
                 1011
      10
                         Samwise
                                       Gamgee
```

	1010	5	T00 005 000	_		
11	1012 Harry	•	706-695-0392			
12	1013 Doi	•	123-543-2345			
13	1014 Leslie	e Knope	876-678-3469	9		
14	1015 Tob	y Flenderson	304-762-2467	7		
15	1016 Roi	n Weasley	123-545-5421	1		
16	1017 Michael	Scott	123-643-9775	5		
17	1018 Clar	k Kent	706-695-0392	2		
18	1019 Creed	d Braton				
19	1020 Anakii	n Skywalker	876-678-3469	9		
		J				
		Addr	ess Paving Cu	ıstomer	Do_Not_Contact	\
0	123 3	Shire Lane, Sh		Yes	No	•
1		West Main Str		No	Yes	
2		98 Drugs Drive		N	NaN	
3	980 Paper Avenue, Per	•	•	Yes	Y	
4	900 raper Avenue, rei	•		Y	No	
5		123 Dragons R				
		768 City Park	•	Yes	Yes	
6		1209 South Str		No	No	
7		98 Clue Dr		N	No	
8		123 Middle Ea		Yes	NaN	
9		Street, New Y		Yes	No	
10		Shire Lane, Sh		Yes	No	
11	2394	4 Hogwarts Ave	nue	Y	NaN	
12		2039 Main Str	eet	Yes	N	
13		343 City Park	way	Yes	No	
14		214 HR Ave	nue	N	No	
15	2398	5 Hogwarts Ave	nue	No	N	
16	121 Paper Ave	nue, Pennsylva	nia	Yes	No	
17		3498 Super L	ane	Y	NaN	
18		_	N/a	N/a	Yes	
19	910 Tatooi	ne Road, Tatoo	ine	Yes	N	
		ŕ				
	Street_Address	Stat	e Zipcode			
0	123 Shire Lane	Shir	_			
1	93 West Main Street	Non				
2	298 Drugs Driveway	Non				
3	980 Paper Avenue					
4	123 Dragons Road	Non				
5	768 City Parkway	Non				
	· · · · · · · · · · · · · · · · · · ·					
6 7	1209 South Street	Non				
7	98 Clue Drive	Non				
8	123 Middle Earth					
9	25th Main Street					
10	612 Shire Lane	Shir				
11	2394 Hogwarts Avenue	Non				
12	2039 Main Street	Non				
13	343 City Parkway	Non	e None			

```
15
          2395 Hogwarts Avenue
                                          None
                                                   None
      16
              121 Paper Avenue
                                  Pennsylvania
                                                   None
      17
               3498 Super Lane
                                          None
                                                   None
      18
                            N/a
                                          None
                                                   None
      19
             910 Tatooine Road
                                                   None
                                      Tatooine
     Replace values in Paying Customer and data cleaning
[19]: df['Paying Customer'] = df['Paying Customer'].str.replace('No', 'N')
[20]: df['Paying Customer'] = df['Paying Customer'].str.replace('Yes', 'Y')
[21]: df['Paying Customer']
[21]: 0
              Y
      1
              N
      2
              N
      3
              Y
      4
              Y
      5
              Y
      6
              N
      7
              N
      8
              Y
      9
              Y
      10
              Y
      11
              Y
      12
              Y
      13
              Y
      14
              N
      15
              N
      16
              Y
      17
              Y
      18
            N/a
      19
      Name: Paying Customer, dtype: object
     Replace N/a and NaN values to Blank
[22]: df = df.replace('N/a','')
[23]: df = df.replace('NaN','') # this not works because its actually blank
      # another method
```

None

None

14

df = df.fillna('')

214 HR Avenue

[24]: df [24]: Phone_Number CustomerID First_Name Last_Name 1001 123-545-5421 0 Frodo Baggins 1 1002 Abed Nadir 123-643-9775 2 1003 Walter White 706-695-0392 3 1004 123-543-2345 Dwight Schrute 4 1005 Jon Snow 876-678-3469 5 1006 Ron Swanson 304-762-2467 6 1007 Jeff Winger 7 Sherlock 1008 Holmes 876-678-3469 Gandalf 8 1009 9 1010 123-545-5421 Peter Parker 10 1011 Samwise Gamgee 11 1012 Harry Potter 706-695-0392 1013 12 Don Draper 123-543-2345 13 1014 Leslie Knope 876-678-3469 14 Toby 1015 Flenderson 304-762-2467 1016 15 Ron Weasley 123-545-5421 1017 123-643-9775 16 Michael Scott 17 1018 Clark Kent 706-695-0392 18 1019 Creed Braton 19 1020 Anakin Skywalker 876-678-3469 Address Paying Customer Do_Not_Contact 0 Y 123 Shire Lane, Shire No 1 93 West Main Street N Yes 2 298 Drugs Driveway N 3 980 Paper Avenue, Pennsylvania, 18503 Y Y 4 123 Dragons Road Y No 768 City Parkway Y 5 Yes 6 1209 South Street N No 7 98 Clue Drive N No 8 123 Middle Earth Y Y 9 25th Main Street, New York No 10 612 Shire Lane, Shire Y No 11 2394 Hogwarts Avenue Y 12 Y 2039 Main Street N Y 13 343 City Parkway No 14 214 HR Avenue N

Street_Address State Zipcode

910 Tatooine Road, Tatooine

121 Paper Avenue, Pennsylvania

2395 Hogwarts Avenue

3498 Super Lane

15

16

17

18

19

No

N

No

Yes

N

N

Y

Y

```
0
          123 Shire Lane
                                    Shire
1
     93 West Main Street
2
      298 Drugs Driveway
3
        980 Paper Avenue
                            Pennsylvania
                                            18503
4
        123 Dragons Road
5
        768 City Parkway
       1209 South Street
6
7
           98 Clue Drive
8
        123 Middle Earth
9
        25th Main Street
                                New York
          612 Shire Lane
10
                                   Shire
11
    2394 Hogwarts Avenue
        2039 Main Street
12
13
        343 City Parkway
14
           214 HR Avenue
15
    2395 Hogwarts Avenue
16
        121 Paper Avenue
                            Pennsylvania
17
         3498 Super Lane
18
19
       910 Tatooine Road
                                Tatooine
```

Replace values in Do_Not_Contact and data cleaning

```
[25]: df['Do_Not_Contact'] = df['Do_Not_Contact'].str.replace('Yes', 'Y')
     df['Do_Not_Contact'] = df['Do_Not_Contact'].str.replace('No', 'N')
     df['Do_Not_Contact']
[27]: 0
            N
      1
            Y
      2
      3
            Y
      4
            N
      5
            Y
      6
            N
      7
            N
      8
      9
            N
      10
            N
      11
      12
            N
      13
            N
      14
            N
      15
            N
      16
            N
      17
```

18 Y 19 N

Name: Do_Not_Contact, dtype: object

oop through each index in the DataFrame

Check if the Do_Not_Contact value at index x is equal to 'Y'

Drop the row with index x if Do_Not_Contact is 'Y'

```
[28]: # Iterate over each index in the DataFrame
for x in df.index:
    # Check if the 'Do_Not_Contact' value at index x is equal to 'Y'
    if df.loc[x, "Do_Not_Contact"] == 'Y':
        # Drop the row with index x if 'Do_Not_Contact' is 'Y'
        df.drop(x, inplace=True)
df
```

[28]:		${\tt CustomerID}$	First_Name	${\tt Last_Name}$	Phone_Number	\
	0	1001	Frodo	Baggins	123-545-5421	
	2	1003	Walter	White	706-695-0392	
	4	1005	Jon	Snow	876-678-3469	
	6	1007	Jeff	Winger		
	7	1008	Sherlock	Holmes	876-678-3469	
	8	1009	Gandalf			
	9	1010	Peter	Parker	123-545-5421	
	10	1011	Samwise	Gamgee		
	11	1012	Harry	Potter	706-695-0392	
	12	1013	Don	Draper	123-543-2345	
	13	1014	Leslie	Knope	876-678-3469	
	14	1015	Toby	Flenderson	304-762-2467	
	15	1016	Ron	Weasley	123-545-5421	
	16	1017	Michael	Scott	123-643-9775	
	17	1018	Clark	Kent	706-695-0392	
	19	1020	Anakin	Skywalker	876-678-3469	

	Address	Paying Customer	Do_Not_Contact	\
0	123 Shire Lane, Shire	Y	N	
2	298 Drugs Driveway	N		
4	123 Dragons Road	Y	N	
6	1209 South Street	N	N	
7	98 Clue Drive	N	N	
8	123 Middle Earth	Y		
9	25th Main Street, New York	Y	N	
10	612 Shire Lane, Shire	Y	N	
11	2394 Hogwarts Avenue	Y		
12	2039 Main Street	Y	N	

```
13
                  343 City Parkway
                                                   Y
                                                                   N
14
                      214 HR Avenue
                                                   N
                                                                   N
15
              2395 Hogwarts Avenue
                                                   N
                                                                   N
16
    121 Paper Avenue, Pennsylvania
                                                   Y
                                                                   N
17
                    3498 Super Lane
                                                   Y
19
       910 Tatooine Road, Tatooine
                                                   Y
                                                                   N
          Street_Address
                                   State Zipcode
0
          123 Shire Lane
                                   Shire
2
      298 Drugs Driveway
4
        123 Dragons Road
6
       1209 South Street
7
           98 Clue Drive
8
        123 Middle Earth
9
                                New York
        25th Main Street
10
          612 Shire Lane
                                   Shire
11
    2394 Hogwarts Avenue
12
        2039 Main Street
13
        343 City Parkway
14
           214 HR Avenue
15
    2395 Hogwarts Avenue
16
        121 Paper Avenue
                            Pennsylvania
17
         3498 Super Lane
19
       910 Tatooine Road
                                Tatooine
```

Iterate over each index in the DataFrame

Check if the Phone_Number value at index x is an empty string

Drop the row with index x if Phone_Number is an empty string

```
[29]: # Iterate over each index in the DataFrame
for x in df.index:
    # Check if the 'Phone_Number' value at index x is an empty string
    if df.loc[x, "Phone_Number"] == '':
        # Drop the row with index x if 'Phone_Number' is an empty string
        df.drop(x, inplace=True)

df

#Another way to drop null values
#df = df.dropna(subset="Phone_Number"), inplace=True)
```

```
876-678-3469
      4
                 1005
                             Jon
                                         Snow
      7
                 1008
                        Sherlock
                                       Holmes
                                               876-678-3469
      9
                 1010
                           Peter
                                       Parker
                                               123-545-5421
      11
                 1012
                           Harry
                                       Potter 706-695-0392
      12
                 1013
                                              123-543-2345
                             Don
                                       Draper
      13
                 1014
                          Leslie
                                        Knope
                                               876-678-3469
      14
                 1015
                                  Flenderson
                                               304-762-2467
                            Toby
      15
                 1016
                             Ron
                                      Weasley
                                                123-545-5421
                 1017
      16
                        Michael
                                        Scott
                                               123-643-9775
      17
                 1018
                           Clark
                                         Kent
                                               706-695-0392
      19
                 1020
                          Anakin
                                               876-678-3469
                                    Skywalker
                                   Address Paying Customer Do_Not_Contact
      0
                    123 Shire Lane, Shire
                                                          Y
                                                                          N
      2
                                                          N
                       298 Drugs Driveway
      4
                                                          Y
                         123 Dragons Road
                                                                          N
      7
                            98 Clue Drive
                                                          N
                                                                          N
      9
              25th Main Street, New York
                                                          Y
                                                                          N
      11
                     2394 Hogwarts Avenue
                                                          Y
      12
                         2039 Main Street
                                                          Y
                                                                          N
      13
                                                          Y
                         343 City Parkway
                                                                          N
      14
                            214 HR Avenue
                                                          N
                                                                          N
      15
                     2395 Hogwarts Avenue
                                                          N
                                                                          N
      16
          121 Paper Avenue, Pennsylvania
                                                          Y
                                                                          N
      17
                          3498 Super Lane
                                                          Y
      19
             910 Tatooine Road, Tatooine
                                                          Y
                                                                          N
                 Street_Address
                                          State Zipcode
      0
                 123 Shire Lane
                                          Shire
      2
            298 Drugs Driveway
      4
              123 Dragons Road
      7
                  98 Clue Drive
      9
                                       New York
              25th Main Street
      11
          2394 Hogwarts Avenue
      12
              2039 Main Street
      13
              343 City Parkway
      14
                  214 HR Avenue
      15
          2395 Hogwarts Avenue
      16
              121 Paper Avenue
                                   Pennsylvania
      17
               3498 Super Lane
      19
             910 Tatooine Road
                                       Tatooine
[30]: df = df.reset_index(drop=True)
      df
[30]:
          CustomerID First_Name
                                    Last_Name Phone_Number
      0
                 1001
                           Frodo
                                      Baggins
                                               123-545-5421
```

```
1
          1003
                    Walter
                                  White
                                        706-695-0392
2
                                         876-678-3469
          1005
                                   Snow
                       Jon
3
          1008
                  Sherlock
                                 Holmes
                                         876-678-3469
4
          1010
                     Peter
                                 Parker
                                         123-545-5421
5
          1012
                     Harry
                                 Potter
                                        706-695-0392
          1013
6
                       Don
                                 Draper
                                         123-543-2345
7
          1014
                    Leslie
                                         876-678-3469
                                  Knope
8
          1015
                      Toby
                            Flenderson
                                         304-762-2467
9
          1016
                       Ron
                                Weasley
                                         123-545-5421
10
          1017
                  Michael
                                  Scott
                                         123-643-9775
          1018
                     Clark
                                   Kent
                                         706-695-0392
11
12
          1020
                    Anakin
                             Skywalker 876-678-3469
                            Address Paying Customer Do_Not_Contact
0
                                                    Y
             123 Shire Lane, Shire
                                                                    N
1
                 298 Drugs Driveway
                                                    N
2
                                                    Y
                   123 Dragons Road
                                                                    N
3
                      98 Clue Drive
                                                    N
                                                                    N
4
                                                    Y
        25th Main Street, New York
                                                                    N
                                                    Y
5
               2394 Hogwarts Avenue
6
                   2039 Main Street
                                                    Y
                                                                    N
7
                   343 City Parkway
                                                    Y
                                                                    N
8
                      214 HR Avenue
                                                    N
                                                                    N
9
               2395 Hogwarts Avenue
                                                    N
                                                                    N
10
    121 Paper Avenue, Pennsylvania
                                                    Y
                                                                    N
11
                    3498 Super Lane
                                                    Y
12
                                                    Y
       910 Tatooine Road, Tatooine
                                                                    N
          Street_Address
                                    State Zipcode
0
          123 Shire Lane
                                    Shire
1
      298 Drugs Driveway
2
        123 Dragons Road
3
           98 Clue Drive
4
        25th Main Street
                                 New York
5
    2394 Hogwarts Avenue
6
        2039 Main Street
7
        343 City Parkway
8
           214 HR Avenue
9
    2395 Hogwarts Avenue
10
        121 Paper Avenue
                            Pennsylvania
11
         3498 Super Lane
12
       910 Tatooine Road
                                 Tatooine
```