

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

```
df = pd.read_csv("Whether_Data.csv")
```

```
df.shape
```

```
(8784, 8)
```

```
df.head()
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	
1	01-01-2012 01:00	-1.8	-3.7	87	
2	01-01-2012 02:00	-1.8	-3.4	89	
3	01-01-2012 03:00	-1.5	-3.2	88	
4	01-01-2012 04:00	-1.5	-3.3	88	

	Visibility_km	Press_kPa	Weather
0	8.0	101.24	Fog
1	8.0	101.24	Fog
2	4.0	101.26	Freezing Drizzle,Fog
3	4.0	101.27	Freezing Drizzle,Fog
4	4.8	101.23	Fog

```
df.tail()
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
8779	12/31/2012 19:00	0.1	-2.7	81	
8780	12/31/2012 20:00	0.2	-2.4	83	
8781	12/31/2012 21:00	-0.5	-1.5	93	
8782	12/31/2012 22:00	-0.2	-1.8	89	
8783	12/31/2012 23:00	0.0	-2.1	86	

	Visibility_km	Press_kPa	Weather
8779	9.7	100.13	Snow

8780	9.7	100.03	Snow
8781	4.8	99.95	Snow
8782	9.7	99.91	Snow
8783	11.3	99.89	Snow

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 8784 entries, 0 to 8783
```

```
Data columns (total 8 columns):
```

#	Column	Non-Null Count	Dtype
0	Date/Time	8784 non-null	object
1	Temp_C	8784 non-null	float64
2	Dew Point Temp_C	8784 non-null	float64
3	Rel Hum_%	8784 non-null	int64
4	Wind Speed_km/h	8784 non-null	int64
5	Visibility_km	8784 non-null	float64
6	Press_kPa	8784 non-null	float64
7	Weather	8784 non-null	object

```
dtypes: float64(4), int64(2), object(2)
```

```
memory usage: 549.1+ KB
```

```
df.isnull().sum()
```

Date/Time	0
Temp_C	0
Dew Point Temp_C	0
Rel Hum_%	0
Wind Speed_km/h	0
Visibility_km	0
Press_kPa	0
Weather	0

```
dtype: int64
```

```
df.index
```

```
RangeIndex(start=0, stop=8784, step=1)
```

```
df.columns
```

```
Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',  
      'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather'],  
      dtype='object')
```

```
df.dtypes
```

Date/Time	object
Temp_C	float64
Dew Point Temp_C	float64
Rel Hum_%	int64

```

Wind_Speed_km/h      int64
Visibility_km         float64
Press_kPa            float64
Weather              object
dtype: object

df['Weather'].unique()

array(['Fog', 'Freezing Drizzle,Fog', 'Mostly Cloudy', 'Cloudy',
'Rain',
'Rain Showers', 'Mainly Clear', 'Snow Showers', 'Snow',
'Clear',
'Freezing Rain,Fog', 'Freezing Rain', 'Freezing Drizzle',
'Rain,Snow', 'Moderate Snow', 'Freezing Drizzle,Snow',
'Freezing Rain,Snow Grains', 'Snow,Blowing Snow', 'Freezing
Fog',
'Haze', 'Rain,Fog', 'Drizzle,Fog', 'Drizzle',
'Freezing Drizzle,Haze', 'Freezing Rain,Haze', 'Snow,Haze',
'Snow,Fog', 'Snow,Ice Pellets', 'Rain,Haze',
'Thunderstorms,Rain',
'Thunderstorms,Rain Showers', 'Thunderstorms,Heavy Rain
Showers',
'Thunderstorms,Rain Showers,Fog', 'Thunderstorms',
'Thunderstorms,Rain,Fog',
'Thunderstorms,Moderate Rain Showers,Fog', 'Rain Showers,Fog',
'Rain Showers,Snow Showers', 'Snow Pellets', 'Rain,Snow,Fog',
'Moderate Rain,Fog', 'Freezing Rain,Ice Pellets,Fog',
'Drizzle,Ice Pellets,Fog', 'Drizzle,Snow', 'Rain,Ice Pellets',
'Drizzle,Snow,Fog', 'Rain,Snow Grains', 'Rain,Snow,Ice
Pellets',
'Snow Showers,Fog', 'Moderate Snow,Blowing Snow'],
dtype=object)

# nunique() -> applies on whole data as well as column
df.nunique()

Date/Time      8784
Temp_C         533
Dew Point Temp_C  489
Rel Hum_%       83
Wind Speed_km/h   34
Visibility_km     24
Press_kPa       518
Weather         50
dtype: int64

df.count()

Date/Time      8784
Temp_C         8784
Dew Point Temp_C  8784

```

```

Rel_Hum_%      8784
Wind_Speed_km/h 8784
Visibility_km    8784
Press_kPa       8784
Weather         8784
dtype: int64

```

```
df.value_counts()
```

```

Date/Time      Temp_C  Dew Point Temp_C  Rel_Hum_%  Wind_Speed_km/h
Visibility_km  Press_kPa  Weather
01-01-2012 00:00   -1.8    -3.9           86           4
8.0           101.24    Fog           1
3/21/2012 12:00    22.3    12.6           54          15
24.1          101.94    Clear          1
3/20/2012 7:00     5.5    -0.1           67           4
24.1          102.00    Clear          1
3/20/2012 8:00     8.0     0.6           60           6
24.1          102.08    Clear          1
3/20/2012 9:00    10.6     1.3           53           0
19.3          102.09    Mainly Clear   1
..
1/26/2012 3:00    -8.1    -12.5           71           0
25.0          101.97    Clear          1
1/26/2012 2:00    -8.2    -12.6           71           6
25.0          101.99    Clear          1
1/26/2012 23:00   -5.8    -9.1           77          22
6.4           100.81    Snow           1
1/26/2012 22:00   -5.3    -10.2           68          22
16.1          100.92    Snow           1
9/30/2012 9:00    11.7     9.9           89          20
19.3          100.84    Cloudy         1
Name: count, Length: 8784, dtype: int64

```

Que.1) Find the unique "Wind Speed" values in the data.

```

df['Wind_Speed_km/h'].unique()

array([ 4,  7,  6,  9, 15, 13, 20, 22, 19, 24, 30, 35, 39, 32, 33, 26,
        44,
        43, 48, 37, 28, 17, 11,  0, 83, 70, 57, 46, 41, 52, 50, 63, 54,
        2],
      dtype=int64)

df.nunique()

Date/Time      8784
Temp_C         533
Dew Point Temp_C 489

```

Rel Hum_%	83
Wind Speed_km/h	34
Visibility_km	24
Press_kPa	518
Weather	50
dtype:	int64

Que.2) find the no.of times when the "wheather is exactly clear".

```
df['Weather'].value_counts()
```

Weather	
Mainly Clear	2106
Mostly Cloudy	2069
Cloudy	1728
Clear	1326
Snow	390
Rain	306
Rain Showers	188
Fog	150
Rain,Fog	116
Drizzle,Fog	80
Snow Showers	60
Drizzle	41
Snow,Fog	37
Snow,Blowing Snow	19
Rain,Snow	18
Thunderstorms,Rain Showers	16
Haze	16
Drizzle,Snow,Fog	15
Freezing Rain	14
Freezing Drizzle,Snow	11
Freezing Drizzle	7
Snow,Ice Pellets	6
Freezing Drizzle,Fog	6
Snow,Haze	5
Freezing Fog	4
Snow Showers,Fog	4
Moderate Snow	4
Rain,Snow,Ice Pellets	4
Freezing Rain,Fog	4
Freezing Drizzle,Haze	3
Rain,Haze	3
Thunderstorms,Rain	3
Thunderstorms,Rain Showers,Fog	3
Freezing Rain,Haze	2
Drizzle,Snow	2
Rain Showers,Snow Showers	2
Thunderstorms	2

Moderate Snow,Blowing Snow	2
Rain Showers,Fog	1
Thunderstorms,Moderate Rain Showers,Fog	1
Snow Pellets	1
Rain,Snow,Fog	1
Moderate Rain,Fog	1
Freezing Rain,Ice Pellets,Fog	1
Drizzle,Ice Pellets,Fog	1
Thunderstorms,Rain,Fog	1
Rain,Ice Pellets	1
Rain,Snow Grains	1
Thunderstorms,Heavy Rain Showers	1
Freezing Rain,Snow Grains	1

Name: count, dtype: int64

```
df[df.Weather == "Clear"]
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind
Speed_km/h \					
67	01-03-2012 19:00	-16.9	-24.8	50	
24					
114	01-05-2012 18:00	-7.1	-14.4	56	
11					
115	01-05-2012 19:00	-9.2	-15.4	61	
7					
116	01-05-2012 20:00	-9.8	-15.7	62	
9					
117	01-05-2012 21:00	-9.0	-14.8	63	
13					
...	...	...	...	...	
...					
8646	12/26/2012 6:00	-13.4	-14.8	89	
4					
8698	12/28/2012 10:00	-6.1	-8.6	82	
19					
8713	12/29/2012 1:00	-11.9	-13.6	87	
11					
8714	12/29/2012 2:00	-11.8	-13.1	90	
13					
8756	12/30/2012 20:00	-13.8	-16.5	80	
24					

	Visibility_km	Press_kPa	Weather
67	25.0	101.74	Clear
114	25.0	100.71	Clear
115	25.0	100.80	Clear
116	25.0	100.83	Clear
117	25.0	100.83	Clear
...	...	...	...
8646	25.0	102.47	Clear

8698	24.1	101.27	Clear
8713	25.0	101.31	Clear
8714	25.0	101.33	Clear
8756	25.0	101.52	Clear

[1326 rows x 8 columns]

df.groupby(['Weather']).get\_group('Clear')

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
67	01-03-2012 19:00	-16.9	-24.8	50	24
114	01-05-2012 18:00	-7.1	-14.4	56	11
115	01-05-2012 19:00	-9.2	-15.4	61	7
116	01-05-2012 20:00	-9.8	-15.7	62	9
117	01-05-2012 21:00	-9.0	-14.8	63	13
...	...	...	...	...	...
8646	12/26/2012 6:00	-13.4	-14.8	89	4
8698	12/28/2012 10:00	-6.1	-8.6	82	19
8713	12/29/2012 1:00	-11.9	-13.6	87	11
8714	12/29/2012 2:00	-11.8	-13.1	90	13
8756	12/30/2012 20:00	-13.8	-16.5	80	24

	Visibility_km	Press_kPa	Weather
67	25.0	101.74	Clear
114	25.0	100.71	Clear
115	25.0	100.80	Clear
116	25.0	100.83	Clear
117	25.0	100.83	Clear
...	...	...	...
8646	25.0	102.47	Clear
8698	24.1	101.27	Clear
8713	25.0	101.31	Clear
8714	25.0	101.33	Clear
8756	25.0	101.52	Clear

[1326 rows x 8 columns]

Que.3) Find the no.of times when the"Wind Speed is exactly 4Km/Hr".

```
df[df['Wind Speed_km/h'] == 4]
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	4
1	01-01-2012 01:00	-1.8	-3.7	87	4
96	01-05-2012 00:00	-8.8	-11.7	79	4
101	01-05-2012 05:00	-7.0	-9.5	82	4
146	01-07-2012 02:00	-8.1	-11.1	79	4
...	...	...	...	...	...
8768	12/31/2012 8:00	-8.6	-10.3	87	4
8769	12/31/2012 9:00	-8.1	-9.6	89	4
8770	12/31/2012 10:00	-7.4	-8.9	89	4
8772	12/31/2012 12:00	-5.8	-7.5	88	4
8773	12/31/2012 13:00	-4.6	-6.6	86	4

	Visibility_km	Press_kPa	Weather
0	8.0	101.24	Fog
1	8.0	101.24	Fog
96	9.7	100.32	Snow
101	4.0	100.19	Snow
146	19.3	100.15	Cloudy
...	...	...	...
8768	3.2	101.14	Snow Showers
8769	2.4	101.09	Snow
8770	6.4	101.05	Snow, Fog
8772	12.9	100.78	Snow
8773	12.9	100.63	Snow

[474 rows x 8 columns]

```
df.groupby(['Wind Speed_km/h']).get_group(4)
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	4
1	01-01-2012 01:00	-1.8	-3.7	87	4



```

96      01-05-2012 00:00      -8.8              -11.7          79
4
101     01-05-2012 05:00      -7.0              -9.5           82
4
146     01-07-2012 02:00      -8.1              -11.1          79
4
...           ...           ...           ...           ...
...
8768    12/31/2012 8:00       -8.6              -10.3          87
4
8769    12/31/2012 9:00       -8.1              -9.6           89
4
8770    12/31/2012 10:00      -7.4              -8.9           89
4
8772    12/31/2012 12:00      -5.8              -7.5           88
4
8773    12/31/2012 13:00      -4.6              -6.6           86
4

```

	Visibility_km	Press_kPa	Weather
0	8.0	101.24	Fog
1	8.0	101.24	Fog
96	9.7	100.32	Snow
101	4.0	100.19	Snow
146	19.3	100.15	Cloudy
...	...	...	...
8768	3.2	101.14	Snow Showers
8769	2.4	101.09	Snow
8770	6.4	101.05	Snow, Fog
8772	12.9	100.78	Snow
8773	12.9	100.63	Snow

```
[474 rows x 8 columns]
```

```
df['Wind Speed_km/h'].value_counts()
```

```

Wind Speed_km/h
9      830
11     791
13     735
15     719
7      677
17     666
19     616
6      609
20     496
4      474
22     439
24     374
0      309

```

```

26      242
28      205
30      161
32      139
33       85
35       53
37       45
39       24
41       22
44       14
43       13
48       13
46       11
52        7
57        5
50        4
2         2
83        1
70        1
63        1
54        1
Name: count, dtype: int64

```

Que.4) Find the all null values in data.

```

df.isnull().sum()
Date/Time      0
Temp_C         0
Dew Point Temp_C  0
Rel Hum_%      0
Wind Speed_km/h  0
Visibility_km   0
Press_kPa      0
Weather        0
dtype: int64

df.notnull().sum()
Date/Time      8784
Temp_C         8784
Dew Point Temp_C  8784
Rel Hum_%      8784
Wind Speed_km/h  8784
Visibility_km   8784
Press_kPa      8784
Weather        8784
dtype: int64

```

Que.5) Rename the Weather column name of dataframe to the "Weather Conduction" .

```
df.rename(columns = {"Weather" : "Weather Condicttion"})
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	
4					
1	01-01-2012 01:00	-1.8	-3.7	87	
4					
2	01-01-2012 02:00	-1.8	-3.4	89	
7					
3	01-01-2012 03:00	-1.5	-3.2	88	
6					
4	01-01-2012 04:00	-1.5	-3.3	88	
7					
...	...	...	...	...	
...					
8779	12/31/2012 19:00	0.1	-2.7	81	
30					
8780	12/31/2012 20:00	0.2	-2.4	83	
24					
8781	12/31/2012 21:00	-0.5	-1.5	93	
28					
8782	12/31/2012 22:00	-0.2	-1.8	89	
28					
8783	12/31/2012 23:00	0.0	-2.1	86	
30					

	Visibility_km	Press_kPa	Weather Condicttion
0	8.0	101.24	Fog
1	8.0	101.24	Fog
2	4.0	101.26	Freezing Drizzle,Fog
3	4.0	101.27	Freezing Drizzle,Fog
4	4.8	101.23	Fog
...	...	...	...
8779	9.7	100.13	Snow
8780	9.7	100.03	Snow
8781	4.8	99.95	Snow
8782	9.7	99.91	Snow
8783	11.3	99.89	Snow

```
[8784 rows x 8 columns]
```

Que.6) What is the mean Visibility.

```
df.head()
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	
4					

```

1 01-01-2012 01:00 -1.8 -3.7 87
4
2 01-01-2012 02:00 -1.8 -3.4 89
7
3 01-01-2012 03:00 -1.5 -3.2 88
6
4 01-01-2012 04:00 -1.5 -3.3 88
7

```

	Visibility_km	Press_kPa	Weather
0	8.0	101.24	Fog
1	8.0	101.24	Fog
2	4.0	101.26	Freezing Drizzle,Fog
3	4.0	101.27	Freezing Drizzle,Fog
4	4.8	101.23	Fog

```
df["Visibility_km"].mean()
```

```
27.664446721311478
```

Que.7) What is the Standard Deviation in Pressure in the data.

```
df['Press_kPa'].std()
```

```
0.8440047459486483
```

Que.8) What is the Variance of Relative Humidity in the data.

```
df['Rel Hum_%'].var()
```

```
286.24855019850196
```

Que.9) Find the all instances when Snow is recorded.

```
df[df["Weather"] == "Snow"]
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h
55	01-03-2012 07:00	-14.0	-19.5	63	19
84	01-04-2012 12:00	-13.7	-21.7	51	11
86	01-04-2012 14:00	-11.3	-19.0	53	7
87	01-04-2012 15:00	-10.2	-16.3	61	11
88	01-04-2012 16:00	-9.4	-15.5	61	13
...	...	...	...	...	...

```

...
8779 12/31/2012 19:00      0.1      -2.7      81
30
8780 12/31/2012 20:00      0.2      -2.4      83
24
8781 12/31/2012 21:00     -0.5      -1.5      93
28
8782 12/31/2012 22:00     -0.2      -1.8      89
28
8783 12/31/2012 23:00      0.0      -2.1      86
30

```

```

      Visibility_km  Press_kPa  Weather
55              25.0    100.95    Snow
84              24.1    101.25    Snow
86              19.3    100.97    Snow
87               9.7    100.89    Snow
88              19.3    100.79    Snow
...              ...         ...    ...
8779              9.7    100.13    Snow
8780              9.7    100.03    Snow
8781              4.8     99.95    Snow
8782              9.7     99.91    Snow
8783             11.3     99.89    Snow

```

[390 rows x 8 columns]

```
df.groupby("Weather").get_group("Snow")
```

```

      Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h \
55  01-03-2012 07:00   -14.0             -19.5      63
19
84  01-04-2012 12:00   -13.7             -21.7      51
11
86  01-04-2012 14:00   -11.3             -19.0      53
7
87  01-04-2012 15:00   -10.2             -16.3      61
11
88  01-04-2012 16:00    -9.4             -15.5      61
13
...              ...         ...         ...         ...
...
8779 12/31/2012 19:00      0.1      -2.7      81
30
8780 12/31/2012 20:00      0.2      -2.4      83
24
8781 12/31/2012 21:00     -0.5      -1.5      93
28
8782 12/31/2012 22:00     -0.2      -1.8      89

```

```
28
8783 12/31/2012 23:00 0.0 -2.1 86
30
```

	Visibility_km	Press_kPa	Weather
55	25.0	100.95	Snow
84	24.1	101.25	Snow
86	19.3	100.97	Snow
87	9.7	100.89	Snow
88	19.3	100.79	Snow
...	...	...	...
8779	9.7	100.13	Snow
8780	9.7	100.03	Snow
8781	4.8	99.95	Snow
8782	9.7	99.91	Snow
8783	11.3	99.89	Snow

```
[390 rows x 8 columns]
```

```
df.Weather.value_counts()
```

Weather	
Mainly Clear	2106
Mostly Cloudy	2069
Cloudy	1728
Clear	1326
Snow	390
Rain	306
Rain Showers	188
Fog	150
Rain,Fog	116
Drizzle,Fog	80
Snow Showers	60
Drizzle	41
Snow,Fog	37
Snow,Blowing Snow	19
Rain,Snow	18
Thunderstorms,Rain Showers	16
Haze	16
Drizzle,Snow,Fog	15
Freezing Rain	14
Freezing Drizzle,Snow	11
Freezing Drizzle	7
Snow,Ice Pellets	6
Freezing Drizzle,Fog	6
Snow,Haze	5
Freezing Fog	4
Snow Showers,Fog	4
Moderate Snow	4
Rain,Snow,Ice Pellets	4

```

Freezing Rain,Fog 4
Freezing Drizzle,Haze 3
Rain,Haze 3
Thunderstorms,Rain 3
Thunderstorms,Rain Showers,Fog 3
Freezing Rain,Haze 2
Drizzle,Snow 2
Rain Showers,Snow Showers 2
Thunderstorms 2
Moderate Snow,Blowing Snow 2
Rain Showers,Fog 1
Thunderstorms,Moderate Rain Showers,Fog 1
Snow Pellets 1
Rain,Snow,Fog 1
Moderate Rain,Fog 1
Freezing Rain,Ice Pellets,Fog 1
Drizzle,Ice Pellets,Fog 1
Thunderstorms,Rain,Fog 1
Rain,Ice Pellets 1
Rain,Snow Grains 1
Thunderstorms,Heavy Rain Showers 1
Freezing Rain,Snow Grains 1
Name: count, dtype: int64

```

```
df[df["Weather"].str.contains("Snow")]
```

	Date/Time	Temp_C	Dew Point	Temp_C	Rel Hum_%	Wind
Speed_km/h \						
41	01-02-2012 17:00	-2.1		-9.5	57	
22						
44	01-02-2012 20:00	-5.6		-13.4	54	
24						
45	01-02-2012 21:00	-5.8		-12.8	58	
26						
47	01-02-2012 23:00	-7.4		-14.1	59	
17						
48	01-03-2012 00:00	-9.0		-16.0	57	
28						
...	...	...		...	...	
...						
8779	12/31/2012 19:00	0.1		-2.7	81	
30						
8780	12/31/2012 20:00	0.2		-2.4	83	
24						
8781	12/31/2012 21:00	-0.5		-1.5	93	
28						
8782	12/31/2012 22:00	-0.2		-1.8	89	
28						
8783	12/31/2012 23:00	0.0		-2.1	86	
30						

	Visibility_km	Press_kPa	Weather	
41	25.0	99.66	Snow	Showers
44	25.0	100.07	Snow	Showers
45	25.0	100.15	Snow	Showers
47	19.3	100.27	Snow	Showers
48	25.0	100.35	Snow	Showers
...	...	...	...	
8779	9.7	100.13	Snow	
8780	9.7	100.03	Snow	
8781	4.8	99.95	Snow	
8782	9.7	99.91	Snow	
8783	11.3	99.89	Snow	

[583 rows x 8 columns]

Que.10) Find all the instances when the Wind Speed is above 24 and Visibility is 25.

```
df[(df["Wind Speed_km/h"] > 24) & (df["Visibility_km"] == 25)]
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
23	01-01-2012 23:00	5.3	2.0	79	
30					
24	01-02-2012 00:00	5.2	1.5	77	
35					
25	01-02-2012 01:00	4.6	0.0	72	
39					
26	01-02-2012 02:00	3.9	-0.9	71	
32					
27	01-02-2012 03:00	3.7	-1.5	69	
33					
...	...	...	...	...	
...					
8705	12/28/2012 17:00	-8.6	-12.0	76	
26					
8753	12/30/2012 17:00	-12.1	-15.8	74	
28					
8755	12/30/2012 19:00	-13.4	-16.5	77	
26					
8759	12/30/2012 23:00	-12.1	-15.1	78	
28					
8760	12/31/2012 0:00	-11.1	-14.4	77	
26					

  

	Visibility_km	Press_kPa	Weather	
23	25.0	99.31	Cloudy	
24	25.0	99.26	Rain	Showers
25	25.0	99.26	Cloudy	



26	25.0	99.26	Mostly Cloudy
27	25.0	99.30	Mostly Cloudy
...	...	...	...
8705	25.0	101.34	Mainly Clear
8753	25.0	101.26	Mainly Clear
8755	25.0	101.47	Mainly Clear
8759	25.0	101.52	Mostly Cloudy
8760	25.0	101.51	Cloudy

[308 rows x 8 columns]

Que.11) What is the minimum and maximum value of each column against each weather column.

```
df.groupby('Weather').max()
```

	Date/Time	Temp_C	\
Weather			
Clear	9/28/2012 4:00	32.8	
Cloudy	9/30/2012 9:00	30.5	
Drizzle	9/30/2012 3:00	18.8	
Drizzle,Fog	9/30/2012 2:00	19.9	
Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	
Drizzle,Snow	12/19/2012 18:00	1.2	
Drizzle,Snow,Fog	12/22/2012 3:00	1.1	
Fog	9/22/2012 0:00	20.8	
Freezing Drizzle	12/17/2012 0:00	-2.3	
Freezing Drizzle,Fog	12-10-2012 05:00	-0.3	
Freezing Drizzle,Haze	02-01-2012 13:00	-5.0	
Freezing Drizzle,Snow	12/28/2012 2:00	-3.3	
Freezing Fog	3/17/2012 6:00	-0.1	
Freezing Rain	12/17/2012 2:00	0.3	
Freezing Rain,Fog	12/17/2012 1:00	0.1	
Freezing Rain,Haze	02-01-2012 15:00	-4.9	
Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6	
Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0	
Haze	3/13/2012 23:00	14.1	
Mainly Clear	9/28/2012 8:00	33.0	
Moderate Rain,Fog	12-10-2012 08:00	1.7	
Moderate Snow	12/27/2012 9:00	-4.9	
Moderate Snow,Blowing Snow	12/27/2012 12:00	-5.4	
Mostly Cloudy	9/29/2012 9:00	32.4	
Rain	9/30/2012 22:00	22.8	
Rain Showers	9/26/2012 16:00	26.4	
Rain Showers,Fog	10/20/2012 3:00	12.8	
Rain Showers,Snow Showers	12-05-2012 10:00	2.2	
Rain,Fog	9/30/2012 23:00	21.7	
Rain,Haze	3/13/2012 9:00	5.5	
Rain,Ice Pellets	12/18/2012 5:00	0.6	
Rain,Snow	4/23/2012 3:00	1.7	

Rain,Snow Grains	12/21/2012 0:00	1.9
Rain,Snow,Fog	12-08-2012 21:00	0.8
Rain,Snow,Ice Pellets	12/21/2012 5:00	1.3
Snow	4/27/2012 9:00	3.7
Snow Pellets	11/24/2012 15:00	0.7
Snow Showers	2/23/2012 13:00	2.9
Snow Showers,Fog	12/29/2012 13:00	-10.0
Snow,Blowing Snow	2/25/2012 9:00	-1.4
Snow,Fog	3/14/2012 19:00	1.1
Snow,Haze	02-01-2012 21:00	-3.6
Snow,Ice Pellets	3/28/2012 8:00	0.8
Thunderstorms	7/16/2012 1:00	26.7
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6
Thunderstorms,Rain	7/23/2012 18:00	21.3
Thunderstorms,Rain Showers	9/14/2012 20:00	25.5
Thunderstorms,Rain Showers,Fog	7/31/2012 20:00	22.9
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6
	Dew Point Temp_C	Rel Hum_
% \		
Weather		
Clear	20.4	99
Cloudy	22.6	99
Drizzle	17.7	96
Drizzle,Fog	19.1	100
Drizzle,Ice Pellets,Fog	-0.7	92
Drizzle,Snow	0.2	95
Drizzle,Snow,Fog	0.6	98
Fog	19.6	100
Freezing Drizzle	-3.3	93
Freezing Drizzle,Fog	-2.3	94
Freezing Drizzle,Haze	-7.7	83
Freezing Drizzle,Snow	-4.6	94
Freezing Fog	-0.3	99
Freezing Rain	-1.7	92

Freezing Rain,Fog	-0.9	93
Freezing Rain,Haze	-7.4	83
Freezing Rain,Ice Pellets,Fog	-3.7	92
Freezing Rain,Snow Grains	-7.3	84
Haze	11.1	86
Mainly Clear	21.2	99
Moderate Rain,Fog	0.8	94
Moderate Snow	-6.7	93
Moderate Snow,Blowing Snow	-6.4	93
Mostly Cloudy	24.4	100
Rain	20.4	99
Rain Showers	23.0	97
Rain Showers,Fog	12.1	96
Rain Showers,Snow Showers	-1.2	78
Rain,Fog	19.5	100
Rain,Haze	2.9	86
Rain,Ice Pellets	-0.6	92
Rain,Snow	0.5	94
Rain,Snow Grains	-2.1	75
Rain,Snow,Fog	0.3	96
Rain,Snow,Ice Pellets	0.1	94
Snow	0.3	96
Snow Pellets	-6.4	59
Snow Showers	-0.7	94
Snow Showers,Fog	-11.1	92
Snow,Blowing Snow	-2.9	91

Snow,Fog	0.8	99
Snow,Haze	-6.4	81
Snow,Ice Pellets	-1.7	92
Thunderstorms	20.1	87
Thunderstorms,Heavy Rain Showers	9.0	88
Thunderstorms,Moderate Rain Showers,Fog	18.5	93
Thunderstorms,Rain	19.1	93
Thunderstorms,Rain Showers	23.1	98
Thunderstorms,Rain Showers,Fog	21.3	91
Thunderstorms,Rain,Fog	18.6	88
Wind Speed_km/h		
Visibility_km \ Weather		
Clear	33	
48.3		
Cloudy	54	
48.3		
Drizzle	30	
25.0		
Drizzle,Fog	28	
9.7		
Drizzle,Ice Pellets,Fog	20	
4.0		
Drizzle,Snow	19	
11.3		
Drizzle,Snow,Fog	32	
9.7		
Fog	22	
9.7		
Freezing Drizzle	26	
12.9		
Freezing Drizzle,Fog	33	
8.0		
Freezing Drizzle,Haze	11	
4.0		
Freezing Drizzle,Snow	24	
12.9		
Freezing Fog	9	

0.8	
Freezing Rain	28
16.1	
Freezing Rain,Fog	26
9.7	
Freezing Rain,Haze	9
2.8	
Freezing Rain,Ice Pellets,Fog	28
8.0	
Freezing Rain,Snow Grains	32
4.8	
Haze	17
9.7	
Mainly Clear	63
48.3	
Moderate Rain,Fog	17
6.4	
Moderate Snow	39
0.8	
Moderate Snow,Blowing Snow	41
0.6	
Mostly Cloudy	83
48.3	
Rain	52
48.3	
Rain Showers	41
48.3	
Rain Showers,Fog	13
6.4	
Rain Showers,Snow Showers	28
24.1	
Rain,Fog	46
9.7	
Rain,Haze	17
9.7	
Rain,Ice Pellets	24
9.7	
Rain,Snow	52
25.0	
Rain,Snow Grains	26
25.0	
Rain,Snow,Fog	9
6.4	
Rain,Snow,Ice Pellets	28
6.4	
Snow	57
25.0	
Snow Pellets	35
2.4	

Snow Showers	37
48.3	
Snow Showers,Fog	22
9.7	
Snow,Blowing Snow	48
9.7	
Snow,Fog	35
9.7	
Snow,Haze	15
6.4	
Snow,Ice Pellets	33
11.3	
Thunderstorms	15
25.0	
Thunderstorms,Heavy Rain Showers	9
2.4	
Thunderstorms,Moderate Rain Showers,Fog	15
3.2	
Thunderstorms,Rain	30
24.1	
Thunderstorms,Rain Showers	32
25.0	
Thunderstorms,Rain Showers,Fog	35
9.7	
Thunderstorms,Rain,Fog	19
4.8	

	Press_kPa
Weather	
Clear	103.63
Cloudy	103.65
Drizzle	101.56
Drizzle,Fog	102.07
Drizzle,Ice Pellets,Fog	100.79
Drizzle,Snow	101.15
Drizzle,Snow,Fog	100.15
Fog	103.04
Freezing Drizzle	101.02
Freezing Drizzle,Fog	101.27
Freezing Drizzle,Haze	100.36
Freezing Drizzle,Snow	101.18
Freezing Fog	102.85
Freezing Rain	101.00
Freezing Rain,Fog	101.01
Freezing Rain,Haze	100.41
Freezing Rain,Ice Pellets,Fog	100.95
Freezing Rain,Snow Grains	98.56
Haze	102.97
Mainly Clear	103.59

Moderate Rain,Fog	99.98
Moderate Snow	100.67
Moderate Snow,Blowing Snow	100.64
Mostly Cloudy	103.65
Rain	102.26
Rain Showers	102.31
Rain Showers,Fog	99.83
Rain Showers,Snow Showers	101.11
Rain,Fog	101.77
Rain,Haze	100.61
Rain,Ice Pellets	100.12
Rain,Snow	101.07
Rain,Snow Grains	100.60
Rain,Snow,Fog	100.73
Rain,Snow,Ice Pellets	100.47
Snow	102.73
Snow Pellets	99.70
Snow Showers	102.50
Snow Showers,Fog	102.52
Snow,Blowing Snow	100.62
Snow,Fog	102.07
Snow,Haze	100.99
Snow,Ice Pellets	100.96
Thunderstorms	100.62
Thunderstorms,Heavy Rain Showers	100.26
Thunderstorms,Moderate Rain Showers,Fog	100.01
Thunderstorms,Rain	100.83
Thunderstorms,Rain Showers	101.06
Thunderstorms,Rain Showers,Fog	100.64
Thunderstorms,Rain,Fog	100.08

```
df.groupby("Weather").min()
```

	Date/Time	Temp_C	\
Weather			
Clear	01-03-2012 19:00	-23.3	
Cloudy	01-01-2012 17:00	-21.4	
Drizzle	05-01-2012 15:00	1.1	
Drizzle,Fog	05-01-2012 16:00	0.0	
Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	
Drizzle,Snow	12/17/2012 15:00	0.9	
Drizzle,Snow,Fog	12/18/2012 21:00	0.3	
Fog	01-01-2012 00:00	-16.0	
Freezing Drizzle	01-07-2012 11:00	-9.0	
Freezing Drizzle,Fog	01-01-2012 02:00	-6.4	
Freezing Drizzle,Haze	02-01-2012 11:00	-5.8	
Freezing Drizzle,Snow	03-02-2012 12:00	-8.3	
Freezing Fog	02-05-2012 10:00	-19.0	
Freezing Rain	01-07-2012 10:00	-6.5	
Freezing Rain,Fog	01-07-2012 09:00	-6.1	

Freezing Rain,Haze	02-01-2012 14:00	-4.9
Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6
Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0
Haze	02-01-2012 10:00	-11.5
Mainly Clear	01-02-2012 12:00	-22.8
Moderate Rain,Fog	12-10-2012 08:00	1.7
Moderate Snow	01-12-2012 15:00	-6.3
Moderate Snow,Blowing Snow	12/27/2012 10:00	-5.5
Mostly Cloudy	01-01-2012 16:00	-23.2
Rain	01-01-2012 18:00	0.3
Rain Showers	01-01-2012 22:00	1.6
Rain Showers,Fog	10/20/2012 3:00	12.8
Rain Showers,Snow Showers	11-04-2012 08:00	2.1
Rain,Fog	03-08-2012 22:00	0.0
Rain,Haze	3/13/2012 7:00	4.0
Rain,Ice Pellets	12/18/2012 5:00	0.6
Rain,Snow	01-10-2012 05:00	0.6
Rain,Snow Grains	12/21/2012 0:00	1.9
Rain,Snow,Fog	12-08-2012 21:00	0.8
Rain,Snow,Ice Pellets	12/21/2012 1:00	0.9
Snow	01-03-2012 07:00	-16.7
Snow Pellets	11/24/2012 15:00	0.7
Snow Showers	01-02-2012 17:00	-13.3
Snow Showers,Fog	12/26/2012 9:00	-11.3
Snow,Blowing Snow	1/13/2012 21:00	-12.0
Snow,Fog	02-10-2012 23:00	-10.1
Snow,Haze	02-01-2012 17:00	-4.3
Snow,Ice Pellets	03-03-2012 04:00	-4.3
Thunderstorms	07-04-2012 16:00	21.6
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6
Thunderstorms,Rain	5/25/2012 20:00	19.4
Thunderstorms,Rain Showers	07-04-2012 17:00	11.0
Thunderstorms,Rain Showers,Fog	6/29/2012 3:00	19.5
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6

	Dew Point Temp_C	Rel Hum_
% \		
Weather		
Clear	-28.5	20
Cloudy	-26.8	18
Drizzle	-0.2	74
Drizzle,Fog	-1.6	85
Drizzle,Ice Pellets,Fog	-0.7	92



Drizzle,Snow	0.1	92
Drizzle,Snow,Fog	-0.1	92
Fog	-17.2	80
Freezing Drizzle	-12.2	78
Freezing Drizzle,Fog	-9.0	82
Freezing Drizzle,Haze	-8.3	81
Freezing Drizzle,Snow	-10.4	79
Freezing Fog	-22.9	71
Freezing Rain	-9.0	81
Freezing Rain,Fog	-8.7	82
Freezing Rain,Haze	-7.5	82
Freezing Rain,Ice Pellets,Fog	-3.7	92
Freezing Rain,Snow Grains	-7.3	84
Haze	-16.0	68
Mainly Clear	-28.0	20
Moderate Rain,Fog	0.8	94
Moderate Snow	-7.6	83
Moderate Snow,Blowing Snow	-6.6	92
Mostly Cloudy	-28.5	18
Rain	-5.7	40
Rain Showers	-7.2	37
Rain Showers,Fog	12.1	96
Rain Showers,Snow Showers	-1.8	75
Rain,Fog	-1.2	83
Rain,Haze	1.0	81
Rain,Ice Pellets	-0.6	92

Rain,Snow	-1.7	81
Rain,Snow Grains	-2.1	75
Rain,Snow,Fog	0.3	96
Rain,Snow,Ice Pellets	-0.7	88
Snow	-24.6	41
Snow Pellets	-6.4	59
Snow Showers	-19.3	52
Snow Showers,Fog	-12.7	89
Snow,Blowing Snow	-16.2	70
Snow,Fog	-12.0	77
Snow,Haze	-7.2	80
Snow,Ice Pellets	-5.9	76
Thunderstorms	19.4	67
Thunderstorms,Heavy Rain Showers	9.0	88
Thunderstorms,Moderate Rain Showers,Fog	18.5	93
Thunderstorms,Rain	18.2	83
Thunderstorms,Rain Showers	7.0	68
Thunderstorms,Rain Showers,Fog	16.1	80
Thunderstorms,Rain,Fog	18.6	88
Wind Speed_km/h		
Visibility_km \		
Weather		
Clear	0	
11.3		
Cloudy	0	
11.3		
Drizzle	0	
6.4		
Drizzle,Fog	0	
1.0		

Drizzle,Ice Pellets,Fog	20
4.0	
Drizzle,Snow	9
9.7	
Drizzle,Snow,Fog	7
2.4	
Fog	0
0.2	
Freezing Drizzle	6
4.8	
Freezing Drizzle,Fog	6
3.6	
Freezing Drizzle,Haze	9
2.0	
Freezing Drizzle,Snow	6
2.4	
Freezing Fog	0
0.2	
Freezing Rain	7
2.8	
Freezing Rain,Fog	7
2.8	
Freezing Rain,Haze	6
2.0	
Freezing Rain,Ice Pellets,Fog	28
8.0	
Freezing Rain,Snow Grains	32
4.8	
Haze	0
4.8	
Mainly Clear	0
12.9	
Moderate Rain,Fog	17
6.4	
Moderate Snow	26
0.6	
Moderate Snow,Blowing Snow	39
0.6	
Mostly Cloudy	0
11.3	
Rain	0
4.0	
Rain Showers	0
6.4	
Rain Showers,Fog	13
6.4	
Rain Showers,Snow Showers	17
19.3	
Rain,Fog	0

2.0	
Rain,Haze	7
4.0	
Rain,Ice Pellets	24
9.7	
Rain,Snow	13
2.4	
Rain,Snow Grains	26
25.0	
Rain,Snow,Fog	9
6.4	
Rain,Snow,Ice Pellets	17
4.8	
Snow	0
1.0	
Snow Pellets	35
2.4	
Snow Showers	0
2.4	
Snow Showers,Fog	7
4.0	
Snow,Blowing Snow	24
0.6	
Snow,Fog	4
1.2	
Snow,Haze	0
4.0	
Snow,Ice Pellets	19
2.8	
Thunderstorms	0
24.1	
Thunderstorms,Heavy Rain Showers	9
2.4	
Thunderstorms,Moderate Rain Showers,Fog	15
3.2	
Thunderstorms,Rain	4
16.1	
Thunderstorms,Rain Showers	7
6.4	
Thunderstorms,Rain Showers,Fog	7
9.7	
Thunderstorms,Rain,Fog	19
4.8	

Press_kPa	
Weather	
Clear	99.52
Cloudy	98.39
Drizzle	97.84

Drizzle,Fog	98.65
Drizzle,Ice Pellets,Fog	100.79
Drizzle,Snow	100.63
Drizzle,Snow,Fog	97.79
Fog	98.31
Freezing Drizzle	98.44
Freezing Drizzle,Fog	98.74
Freezing Drizzle,Haze	100.28
Freezing Drizzle,Snow	99.19
Freezing Fog	101.97
Freezing Rain	98.22
Freezing Rain,Fog	98.32
Freezing Rain,Haze	100.34
Freezing Rain,Ice Pellets,Fog	100.95
Freezing Rain,Snow Grains	98.56
Haze	100.35
Mainly Clear	98.67
Moderate Rain,Fog	99.98
Moderate Snow	99.88
Moderate Snow,Blowing Snow	100.50
Mostly Cloudy	98.36
Rain	97.52
Rain Showers	98.51
Rain Showers,Fog	99.83
Rain Showers,Snow Showers	101.09
Rain,Fog	98.61
Rain,Haze	100.50
Rain,Ice Pellets	100.12
Rain,Snow	98.18
Rain,Snow Grains	100.60
Rain,Snow,Fog	100.73
Rain,Snow,Ice Pellets	99.85
Snow	97.75
Snow Pellets	99.70
Snow Showers	99.49
Snow Showers,Fog	100.63
Snow,Blowing Snow	98.11
Snow,Fog	99.38
Snow,Haze	100.61
Snow,Ice Pellets	99.40
Thunderstorms	99.84
Thunderstorms,Heavy Rain Showers	100.26
Thunderstorms,Moderate Rain Showers,Fog	100.01
Thunderstorms,Rain	100.19
Thunderstorms,Rain Showers	99.65
Thunderstorms,Rain Showers,Fog	99.71
Thunderstorms,Rain,Fog	100.08

Que.12) Show all the records where weather condition is fog.

```
df.groupby("Weather").get_group("Fog")
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
0	01-01-2012 00:00	-1.8	-3.9	86	
4					
1	01-01-2012 01:00	-1.8	-3.7	87	
4					
4	01-01-2012 04:00	-1.5	-3.3	88	
7					
5	01-01-2012 05:00	-1.4	-3.3	87	
9					
6	01-01-2012 06:00	-1.5	-3.1	89	
7					
...	...	...	...	...	
...					
8716	12/29/2012 4:00	-16.0	-17.2	90	
6					
8717	12/29/2012 5:00	-14.8	-15.9	91	
4					
8718	12/29/2012 6:00	-13.8	-15.3	88	
4					
8719	12/29/2012 7:00	-14.8	-16.4	88	
7					
8722	12/29/2012 10:00	-12.0	-13.3	90	
7					

  

	Visibility_km	Press_kPa	Weather
0	8.0	101.24	Fog
1	8.0	101.24	Fog
4	4.8	101.23	Fog
5	6.4	101.27	Fog
6	6.4	101.29	Fog
...	...	...	...
8716	9.7	101.25	Fog
8717	6.4	101.25	Fog
8718	9.7	101.25	Fog
8719	8.0	101.22	Fog
8722	6.4	101.15	Fog

[150 rows x 8 columns]

Que.13) Find all instances when whether is clear or visibility is above 40.

```
df[ (df["Weather"] == "Clear") | (df["Visibility_km"] > 40) ]
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h \
67	01-03-2012 19:00	-16.9	-24.8	50	
24					

```

106  01-05-2012 10:00    -6.0          -10.0          73
17
107  01-05-2012 11:00    -5.6          -10.2          70
22
108  01-05-2012 12:00    -4.7          -9.6           69
20
109  01-05-2012 13:00    -4.4          -9.7           66
26
...
...
8749 12/30/2012 13:00   -12.4         -16.2          73
37
8750 12/30/2012 14:00   -11.8         -16.1          70
37
8751 12/30/2012 15:00   -11.3         -15.6          70
32
8752 12/30/2012 16:00   -11.4         -15.5          72
26
8756 12/30/2012 20:00   -13.8         -16.5          80
24

```

```

      Visibility_km  Press_kPa      Weather
67              25.0    101.74      Clear
106             48.3    100.45  Mainly Clear
107             48.3    100.41  Mainly Clear
108             48.3    100.38  Mainly Clear
109             48.3    100.40  Mainly Clear
...
8749            48.3    100.92  Mostly Cloudy
8750            48.3    100.96  Mainly Clear
8751            48.3    101.05  Mainly Clear
8752            48.3    101.15  Mainly Clear
8756            25.0    101.52      Clear

```

[3027 rows x 8 columns]

Que.14) find the all instances when weather is clear and relative humidity is greater than 50 or visibility is above 40.

```

df[((df["Weather"] == "Clear") & (df["Rel Hum_%"] > 50)) |
(df["Visibility_km"] > 40)]

```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h
106	01-05-2012 10:00	-6.0	-10.0	73	
17					
107	01-05-2012 11:00	-5.6	-10.2	70	
22					
108	01-05-2012 12:00	-4.7	-9.6	69	

```

20
109 01-05-2012 13:00 -4.4 -9.7 66
26
110 01-05-2012 14:00 -5.1 -10.7 65
22
... ... ... ...
...
8749 12/30/2012 13:00 -12.4 -16.2 73
37
8750 12/30/2012 14:00 -11.8 -16.1 70
37
8751 12/30/2012 15:00 -11.3 -15.6 70
32
8752 12/30/2012 16:00 -11.4 -15.5 72
26
8756 12/30/2012 20:00 -13.8 -16.5 80
24

```

	Visibility_km	Press_kPa	Weather
106	48.3	100.45	Mainly Clear
107	48.3	100.41	Mainly Clear
108	48.3	100.38	Mainly Clear
109	48.3	100.40	Mainly Clear
110	48.3	100.46	Mainly Clear
...	...	...	...
8749	48.3	100.92	Mostly Cloudy
8750	48.3	100.96	Mainly Clear
8751	48.3	101.05	Mainly Clear
8752	48.3	101.15	Mainly Clear
8756	25.0	101.52	Clear

[2921 rows x 8 columns]