

In [1]:

```

1 # data
2 import numpy as np
3 import pandas as pd
4
5 # visualization
6 import matplotlib.pyplot as plt
7 import seaborn as sns
8 import plotly.express as px
9 import plotly.graph_objects as go
10
11 # warning
12 import warnings
13 warnings.filterwarnings('ignore')

```

In [2]:

```

1 df = pd.read_excel("main.xlsx")
2 df.info()

```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11500 entries, 0 to 11499
Data columns (total 14 columns):
 #   Column                Non-Null Count  Dtype
---  -
0   자치구(구)            11500 non-null object
1   날짜                  11500 non-null int64
2   1hr 최대 강수량       11500 non-null float64
3   일평균 강수량         11500 non-null float64
4   경사도                11500 non-null float64
5   고도(해발고도)       11500 non-null float64
6   불투수면             11500 non-null float64
7   녹지 면적율           11500 non-null float64
8   하천 면적율           11500 non-null float64
9   복개하천 개수        11500 non-null int64
10  맨홀개수             11500 non-null int64
11  빗물받이 개수        11500 non-null int64
12  빗물 펌프 개수       11500 non-null int64
13  하수관로 비율        11500 non-null object
dtypes: float64(7), int64(5), object(2)
memory usage: 1.2+ MB

```

In [5]:

```
1 df1 = df.drop_duplicates('경사도')
2 df1
3 df2 = df1[['자치구(구)', '경사도']]
4 df2
```

Out[5]:

	자치구(구)	경사도
0	종로	12.033665
92	중	7.516393
184	용산	6.438682
276	성동	5.157443
368	광진	8.774289
460	동대문	4.267833
552	중랑	9.448087
644	성북	9.802389
736	강북	13.331114
828	도봉	11.031232
920	노원	11.096796
1012	은평	11.213680
1104	서대문	9.031532
1196	마포	5.068366
1288	양천	4.476898
1380	강서	4.299934
1472	구로	4.891672
1564	금천	8.893557
1656	영등포	2.223087
1748	동작	5.697837
1840	관악	10.594165
1932	서초	9.745786
2024	강남	5.879383
2116	송파	2.734773
2208	강동	3.944715

In [6]:

```
1 new_df = df2.copy()
2 new_df['자치구(구)'] = new_df['자치구(구)'] + '구'
3
4 new_df
```

Out[6]:

	자치구(구)	경사도
0	종로구	12.033665
92	중구	7.516393
184	용산구	6.438682
276	성동구	5.157443
368	광진구	8.774289
460	동대문구	4.267833
552	종랑구	9.448087
644	성북구	9.802389
736	강북구	13.331114
828	도봉구	11.031232
920	노원구	11.096796
1012	은평구	11.213680
1104	서대문구	9.031532
1196	마포구	5.068366
1288	양천구	4.476898
1380	강서구	4.299934
1472	구로구	4.891672
1564	금천구	8.893557
1656	영등포구	2.223087
1748	동작구	5.697837
1840	관악구	10.594165
1932	서초구	9.745786
2024	강남구	5.879383
2116	송파구	2.734773
2208	강동구	3.944715

In [8]:

```
1 # 위도경도 매핑
2
3 locs = {
4     '종로구': (37.595176, 126.977262),
5     '중구': (37.560229, 126.995971),
6     '용산구': (37.531486, 126.980292),
7     '성동구': (37.550983, 127.041041),
8     '광진구': (37.546714, 127.085754),
9     '동대문구': (37.581916, 127.054846),
10    '중랑구': (37.597810, 127.092896),
11    '성북구': (37.605636, 127.017551),
12    '강북구': (37.643463, 127.011188),
13    '도봉구': (37.6691, 127.0324),
14    '노원구': (37.6524, 127.075),
15    '은평구': (37.619161, 126.927011),
16    '서대문구': (37.5778, 126.9391),
17    '마포구': (37.5593, 126.9083),
18    '양천구': (37.5248, 126.8553),
19    '강서구': (37.5612, 126.8229),
20    '구로구': (37.4944, 126.8564),
21    '금천구': (37.4605, 126.9008),
22    '영등포구': (37.5223, 126.9102),
23    '동작구': (37.4988, 126.9516),
24    '관악구': (37.4673, 126.9454),
25    '서초구': (37.4733, 127.0312),
26    '강남구': (37.4966, 127.063),
27    '송파구': (37.5056, 127.1153),
28    '강동구': (37.5504, 127.147),
29 }
30
31 locs
```

Out[8]:

```
{'종로구': (37.595176, 126.977262),  
'중구': (37.560229, 126.995971),  
'용산구': (37.531486, 126.980292),  
'성동구': (37.550983, 127.041041),  
'광진구': (37.546714, 127.085754),  
'동대문구': (37.581916, 127.054846),  
'중랑구': (37.59781, 127.092896),  
'성북구': (37.605636, 127.017551),  
'강북구': (37.643463, 127.011188),  
'도봉구': (37.6691, 127.0324),  
'노원구': (37.6524, 127.075),  
'은평구': (37.619161, 126.927011),  
'서대문구': (37.5778, 126.9391),  
'마포구': (37.5593, 126.9083),  
'양천구': (37.5248, 126.8553),  
'강서구': (37.5612, 126.8229),  
'구로구': (37.4944, 126.8564),  
'금천구': (37.4605, 126.9008),  
'영등포구': (37.5223, 126.9102),  
'동작구': (37.4988, 126.9516),  
'관악구': (37.4673, 126.9454),  
'서초구': (37.4733, 127.0312),  
'강남구': (37.4966, 127.063),  
'송파구': (37.5056, 127.1153),  
'강동구': (37.5504, 127.147)}
```

In [9]:

```
1 import folium
2
3 geo_json = 'https://raw.githubusercontent.com/southkorea/seoul-maps/master/kostat/2013/json/'
4
5
6
7 m = folium.Map(location=[37.5642135, 127.0016985])
8
9 folium.Choropleth(geo_data = geo_json,
10                   name = 'choropleth',
11                   data = new_df,
12                   columns=['자치구(구)', '경사도'],
13                   key_on = 'feature.properties.name',
14                   fill_color = 'YlGn',
15                   fill_opacity = 0.7,
16                   line_opacity = 0.2,
17 ).add_to(m)
18
19 for key, value in locs.items():
20     text = f"{key}: {new_df.loc[new_df['자치구(구)'] == key, '경사도'].values[0]}"
21     folium.Marker(
22         location=value,
23         icon=folium.DivIcon(
24             icon_size=(0, 0),
25             icon_anchor=(0, 0),
26             html=f'<div style="font-size: 1.0rem; color: black; background-color: rgba(255, 2
27         )
28     ).add_to(m)
29
30 m
```

Out [9]:

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