

# 11. Graphs

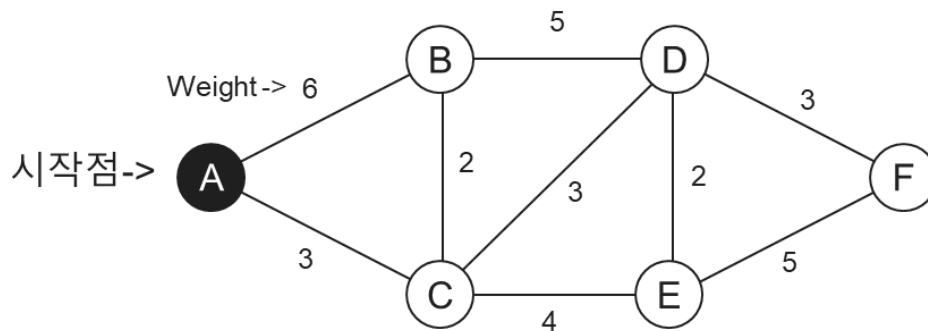
[dbserver.korea@gmail.com](mailto:dbserver.korea@gmail.com)

# Agenda

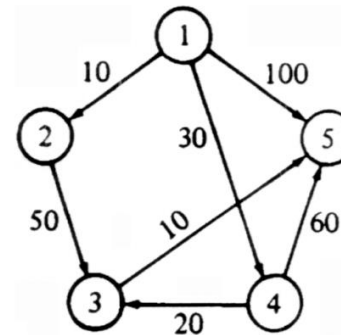
- Graph Problem
  - Shortest Path Algorithm
  - Minimum Spanning Tree (Optional Problem)

# Shortest Path Algorithm

- Implement a function which finds a shortest path from A.
  - Graph is no direction(undirected) and has weights.
  - Use a given weight matrix representing the graph.
  - Algorithms: Use Dijkstra algorithm to find paths.
  - Here is a given graph (Example graph 1):
    - ▶ Start from A (#1)
    - ▶ Perform Dijkstra's algorithm on other graph types (Example graph 2, etc...).



Example Graph 1



Example Graph 2

```

selected: 1 (0)
0 6 3 X X X
selected: 3 (3)
0 5 3 6 7 X
selected: 2 (5)
0 5 3 6 7 X
selected: 4 (6)
0 5 3 6 7 9
selected: 5 (7)
0 5 3 6 7 9
selected: 6 (9)
0 5 3 6 7 9
  
```

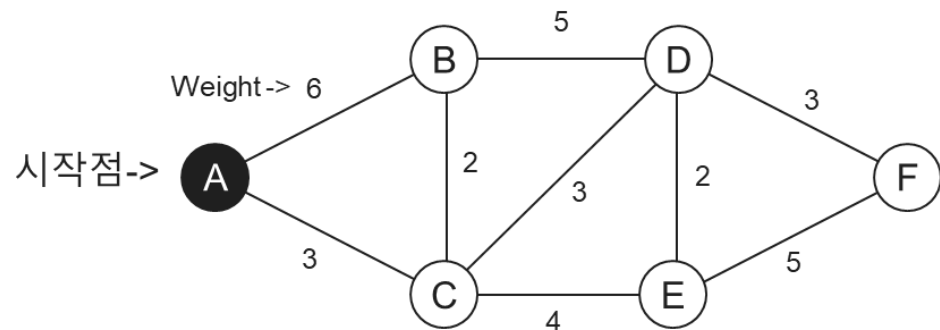
Results::

To 1: 5  
 To 2: 3  
 To 3: 6  
 To 4: 7  
 To 5: 9

Output of E.g. 1

# Minimum Spanning Tree (optional)

- Choose 1 algorithm to solve.
- Minimum spanning tree
  - Implement a function which creates a minimum spanning tree.
  - Graph is no direction(undirected) and has weights.
  - Use matrix to represent your graph.
  - Algorithms:
    1. Kruskal's algorithm
    2. Prim's algorithm
    - Start from A.



Example Graph 1