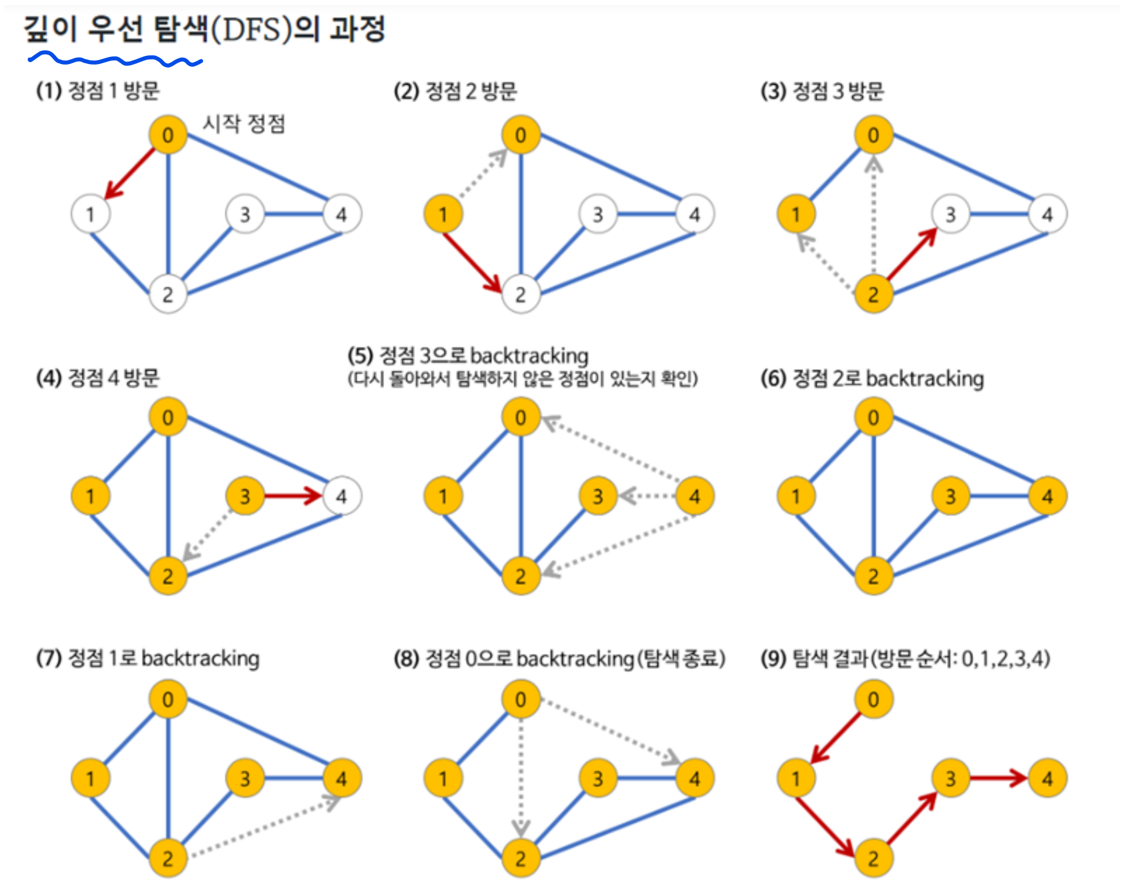
DFS / BFS

DFS : stack, 재귀 이용

BFS : 최단거리/ 촌수 계산 → Queue 이용

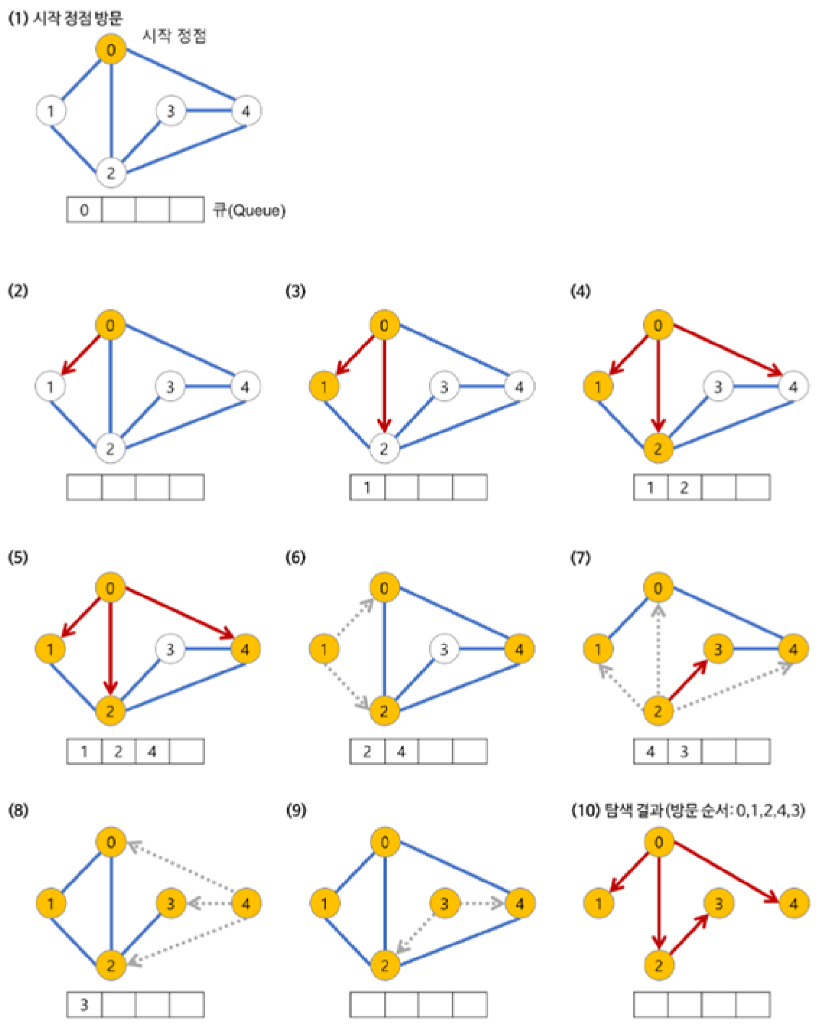
DFS


깊이 우선 탐색(DFS)의 과정
(1) 정점 1 방문
시작 정점
(2) 정점 2 방문
(3) 정점 3 방문
(4) 정점 4 방문
(5) 정점 3으로 backtracking
(다시 돌아와서 탐색하지 않은 정점이 있는지 확인)
(6) 정점 2로 backtracking
(7) 정점 1로 backtracking
(8) 정점 0으로 backtracking(탐색 종료)
(9) 탐색 결과(방문 순서: 0,1,2,3,4)

```
int const VNUM = 5;
vector<int> G[NUM];

G[0].push_back(1);
G[0].push_back(2);
G[0].push_back(4);

...

G[4].push_back(0);
G[4].push_back(3);


int visit[NUM];
```

```
void dfs(int v){
  visit[v] = 1;
  int vsize = G[v].size();
  for(int i = 0 ; i < vsize ; i++){
    int nextv= G[v][i];
    if( visit[nextv]) continue;
    dfs(nextv);
  }
}

int main(){
  int start = 3;
  dfs(start);
}
```

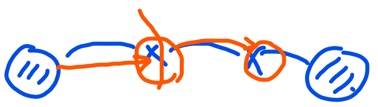
BFS



```
int const VNUM = 5;
vector<int> G[NUM];

G[0].push_back(1);
G[0].push_back(2);
G[0].push_back(4);
```

```
...

G[4].push_back(0);
G[4].push_back(3);


int visit[NUM];

void bfs(int start){
  queue<int> q;
  q.push(start);
  visit[start] = 1;

  while( !q.empty() ){
    int cur = q.front();
    q.pop();

    int vsize = G[cur].size();
    for(int i = 0 ; i < vsize ; i++) {
      int nextv = G[cur][i];
      if( visit[nextv] ) continue;
      q.push(nextv);
      visit[nextv] = 1;
    }
  }

}

int main(){
  int start = 1;
  bfs(start);
}
```

BFS 촌수(Distance) 세는 방법

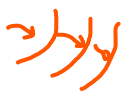


1. element 에 촌수 추가

   queue < pair<int, int > > q 이용

   { vertex, distance } 가 element !

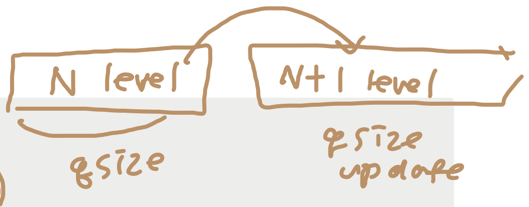
★ BFS



진짜 많이 ★

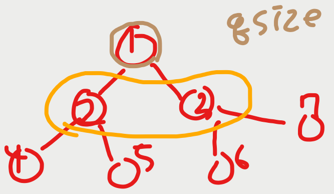
2. queue size 이용하기

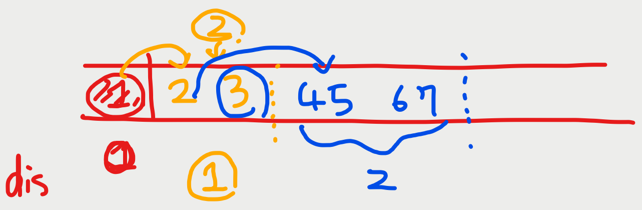
DFS



```
int distance = 0;
queue<int> q;

q.push(start);
visit[start] = 1;

while( !q.empty() ){
  int qsize = q.size();
  while(qsize--){

    int cur = q.front();
    q.pop();

    // cur의 자식들 push
    int vsize = G[cur].size();
    for(int i = 0 ; i < vsize ; i++) {
      int nextv = G[cur][i];
      if( visit[nextv] ) continue;
      q.push(nextv);
      visit[nextv] = 1;
    }
  }
  distance ++;
}
```

시작

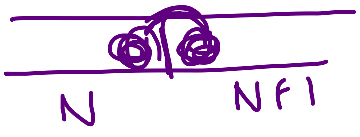




level

다음 level의 개수
= q size

재귀대박!



```
class Node{
 int element
 int distance
}
```

queue < Node >