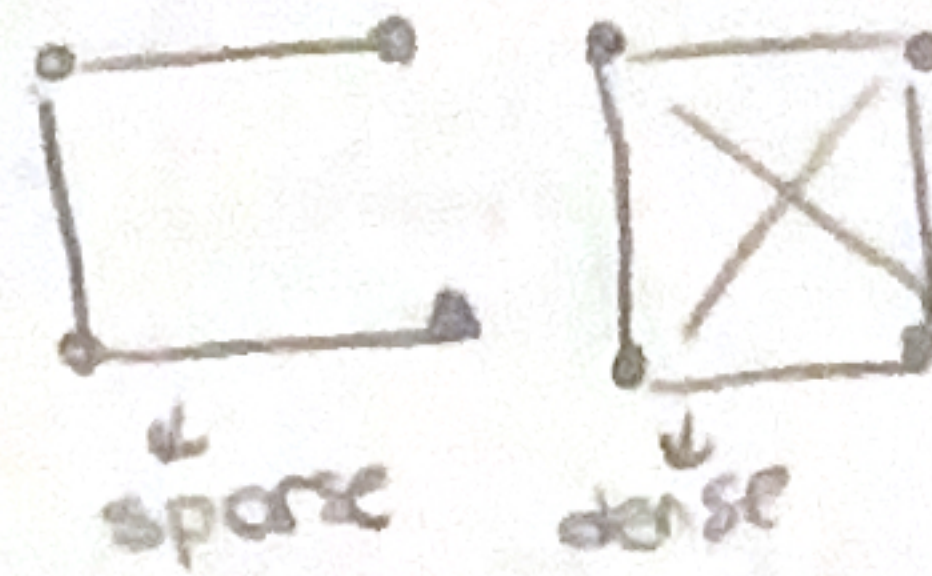


Sparse vs Dense Graphs

- If graph is sparse, adjacency list rep is linear.
- If graph is dense, it is same as adjacency matrix ($O(|V| + |E|)$)
use adj list if graph is sparse!



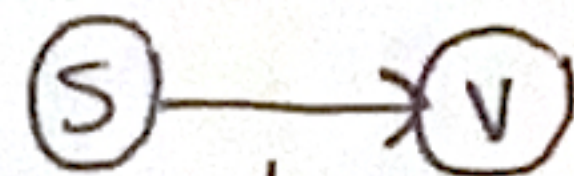
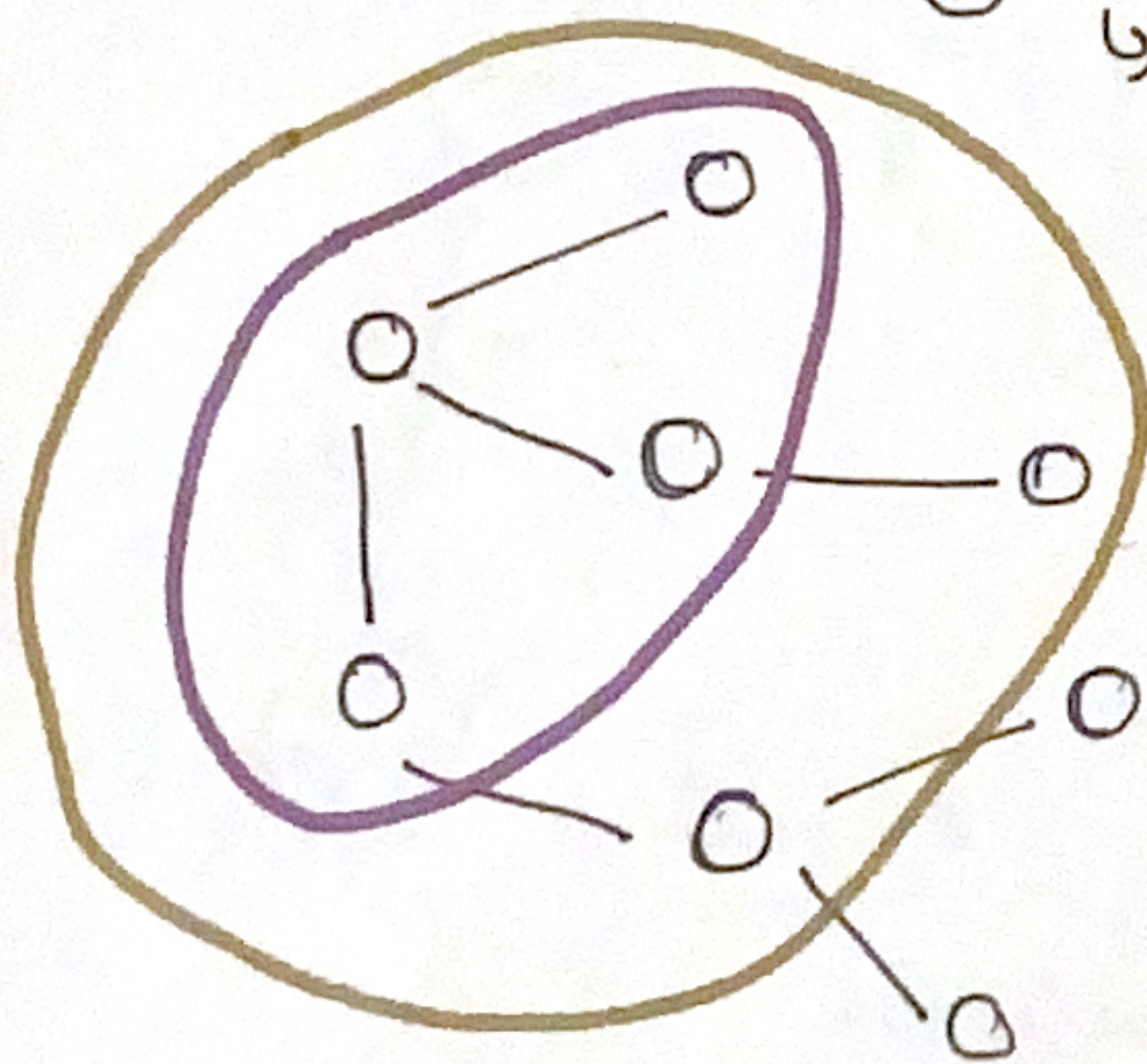
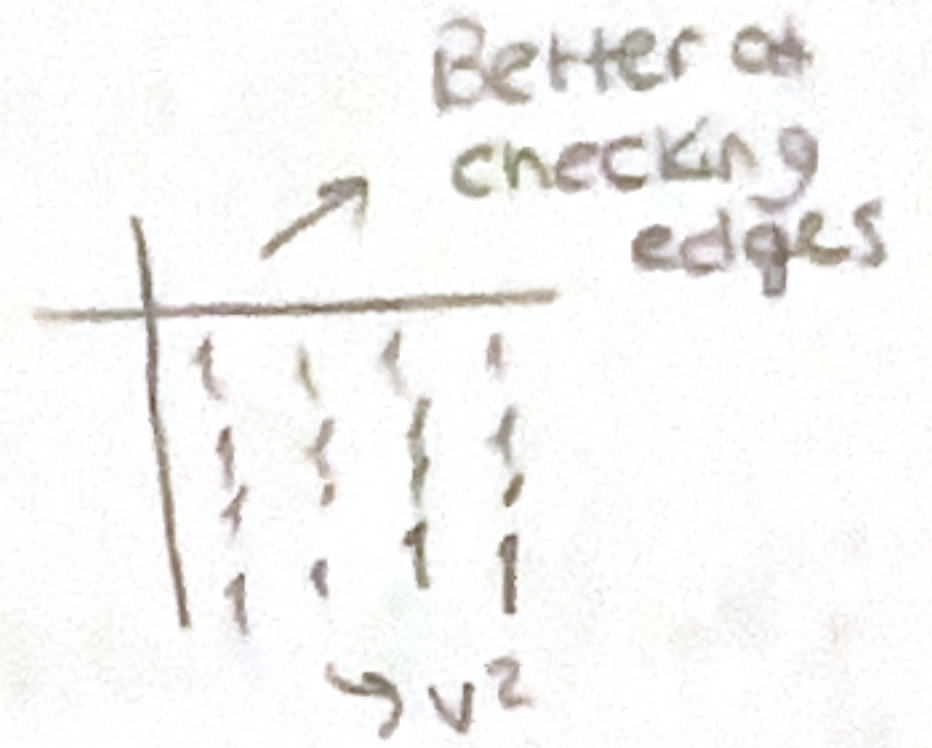
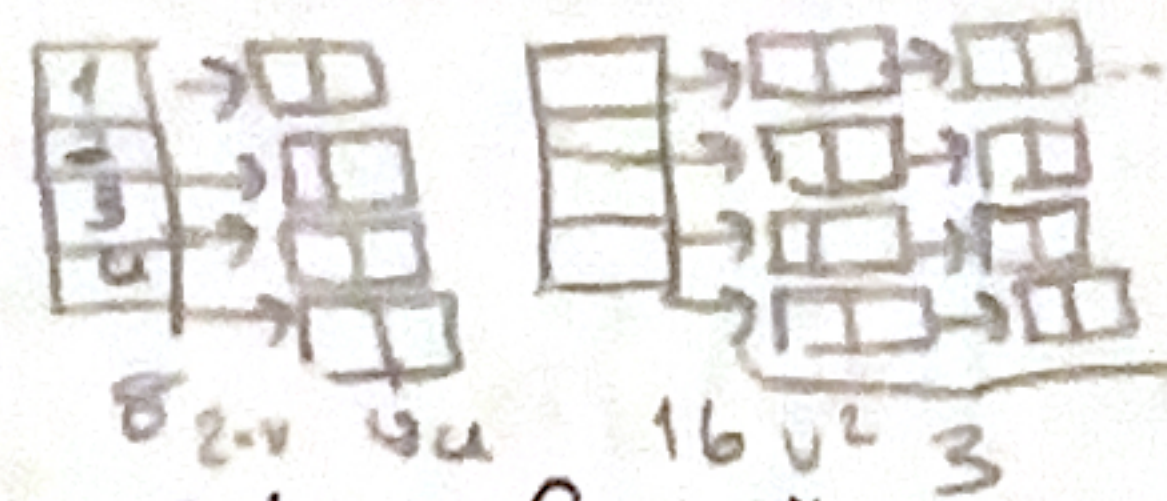
$|V|^2$

Graph Traversals

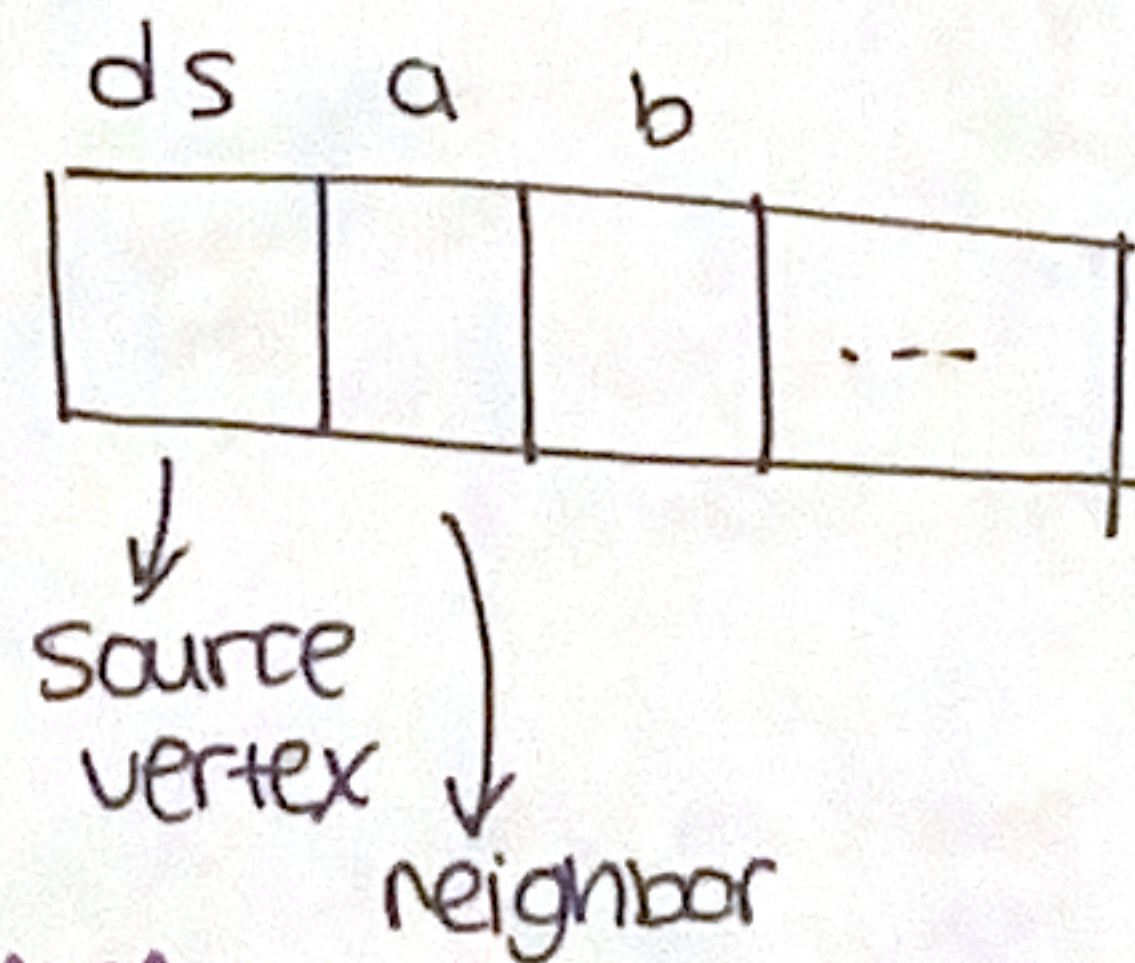
Breadth First Search

Input $\rightarrow G(V, E)$

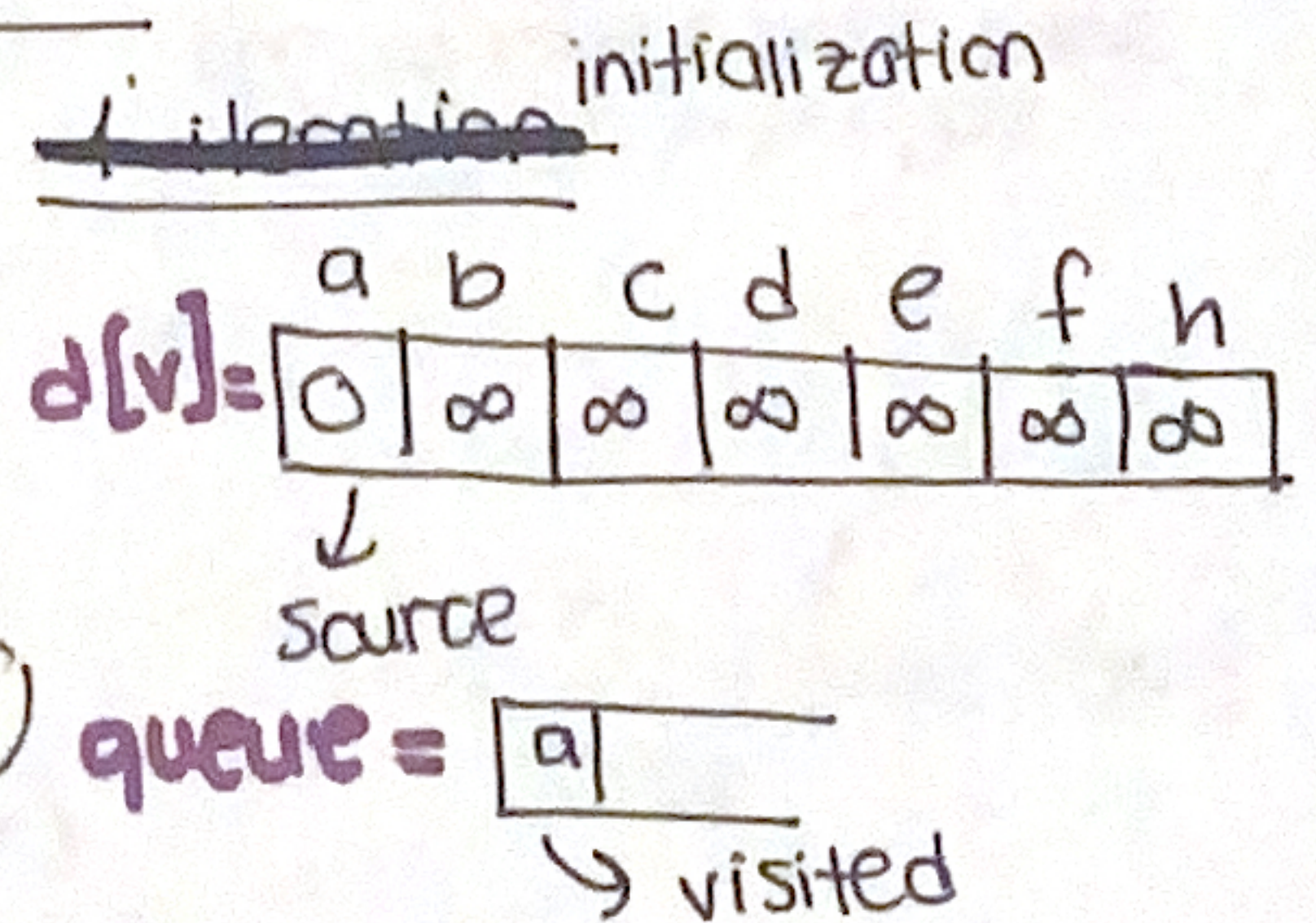
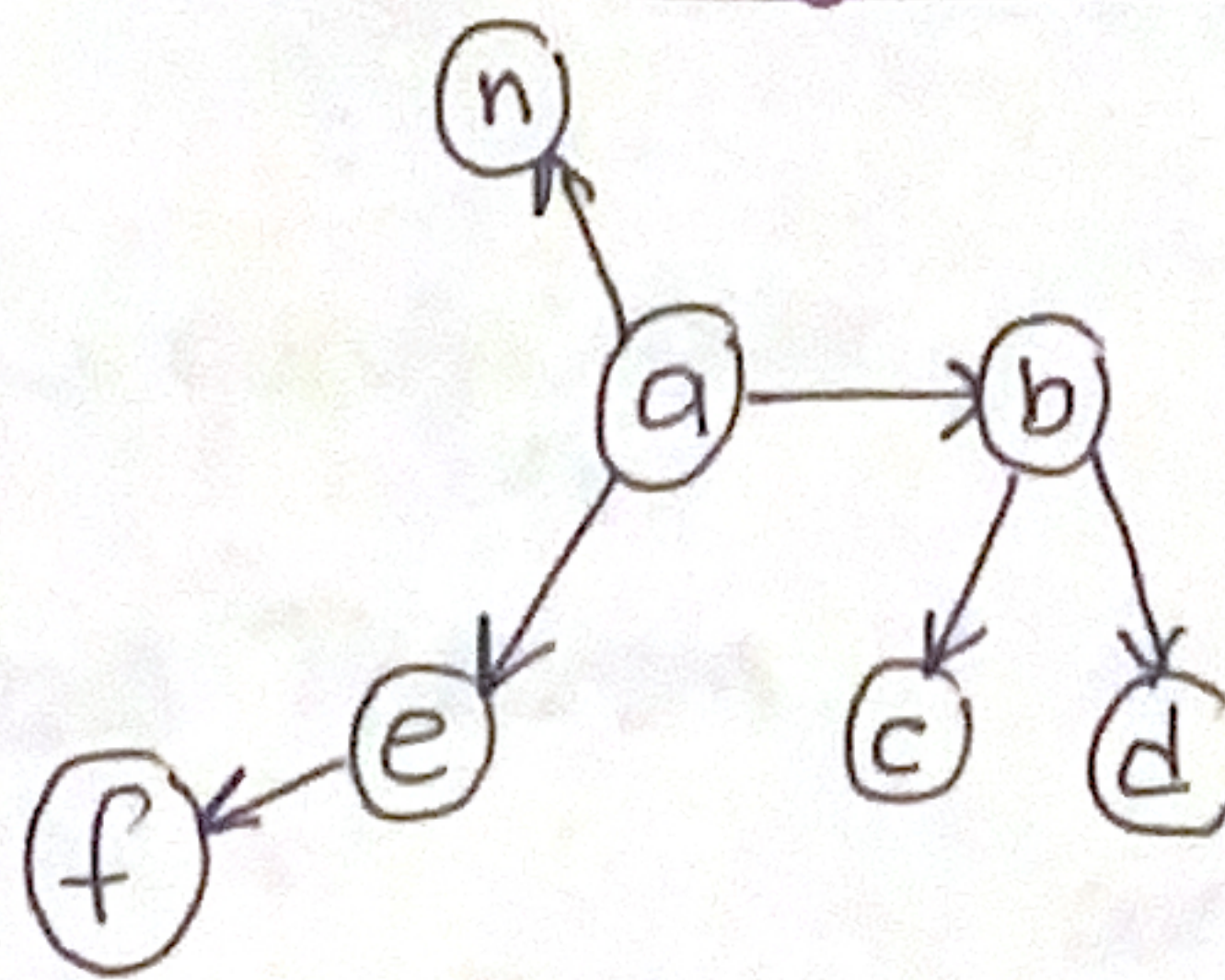
Output $\rightarrow d[v]$ distance from s to v for all vertices of V
 $\rightarrow$ distance array



$\rightarrow$ distance, how many edges are between them?



Algorithm



2. iteration

dequeue b.

check if b's neighbors = ∞

a	b	c	d	e	f	h
0	1	2	2	1	∞	1

$\downarrow$ b+1 $\downarrow$ b+1

1) iteration

check a's neighbors.

dequeue a.

add them if their distance is ∞

a	b	c	d	e	f	h
0	1	∞	∞	1	∞	1

[b, e, h]

$\rightarrow$ enqueued (visited)

3. iteration $\rightarrow$ dequeue e, do the same

terminate when queue gets empty

③