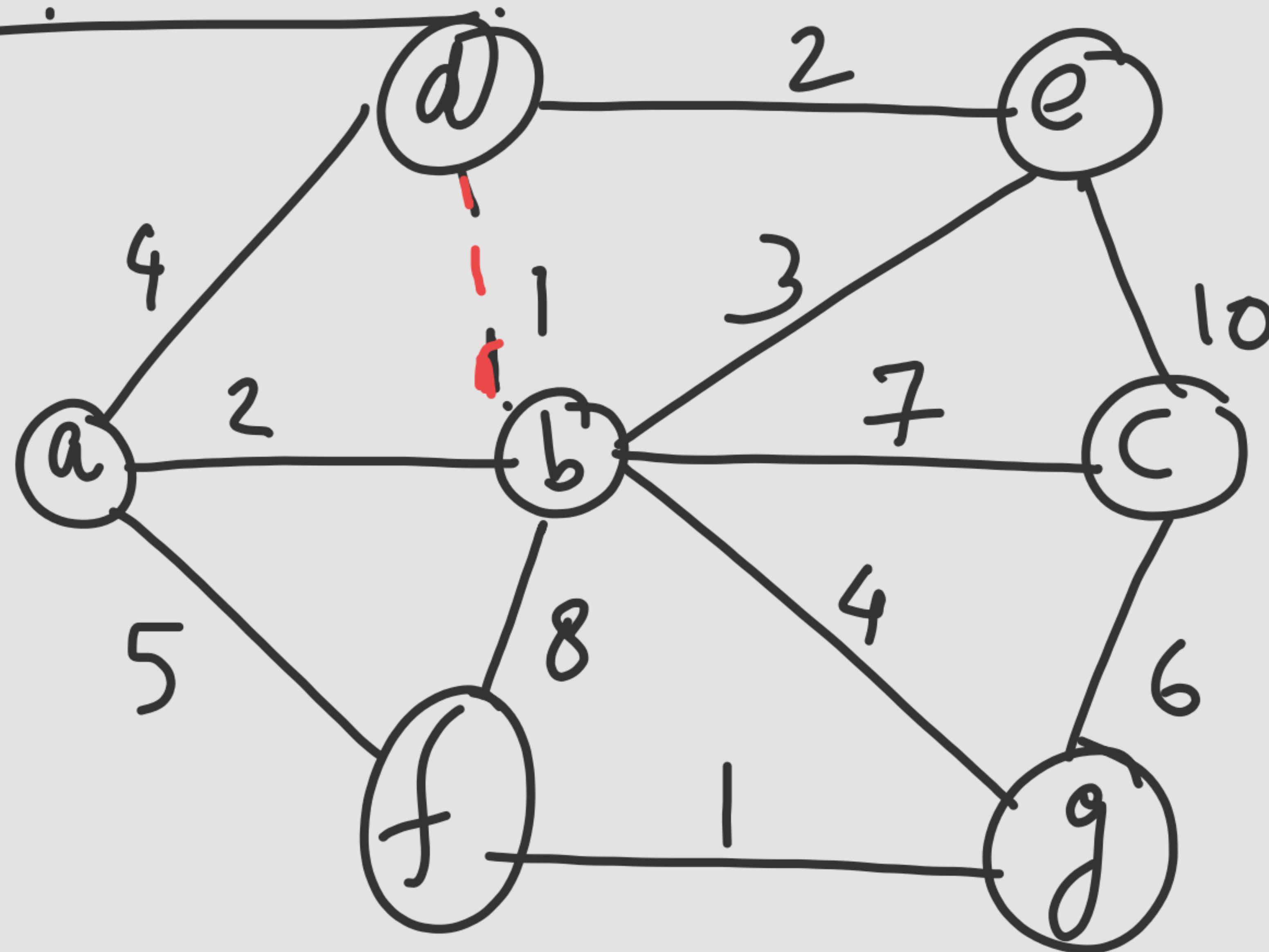
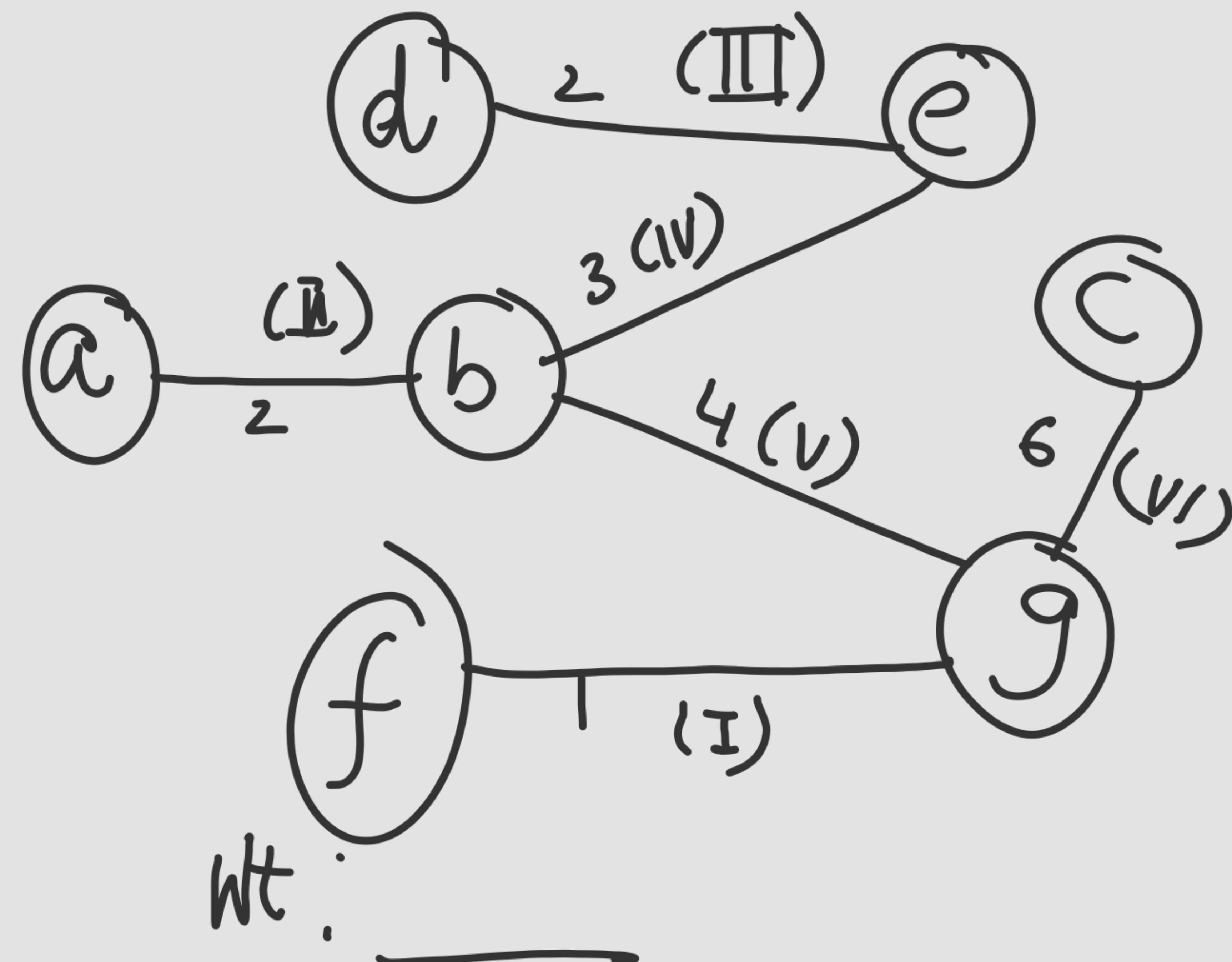


KRUSKAL



Edge	fg	ab	de	be	ad	bg	af	cg	bc
Weight	1	2	2	3	4	4	5	6	7
bf		ec							
8		10							



Adjacency Matrix

$$(V, E) = (N \times V)$$

[
]
v x v

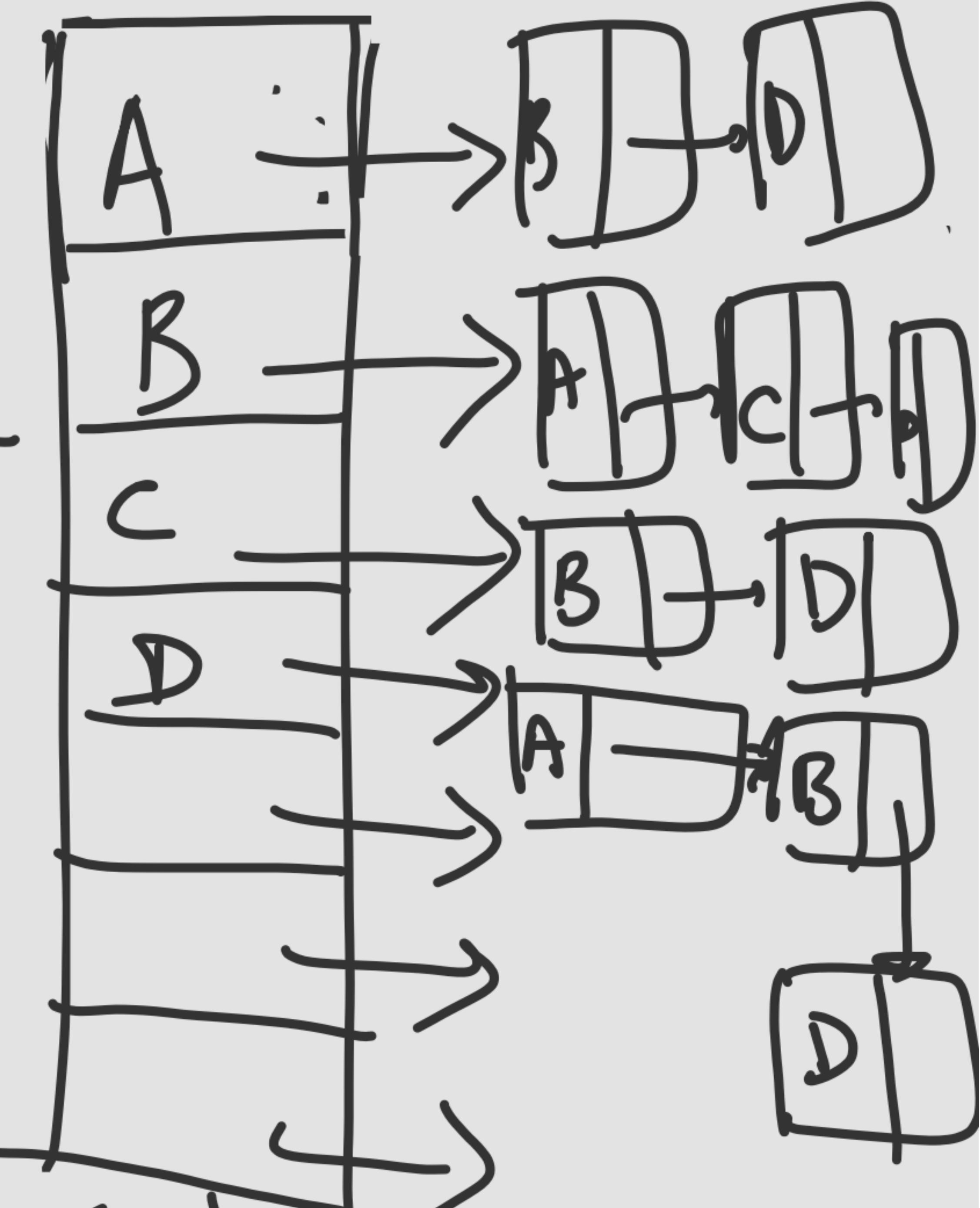
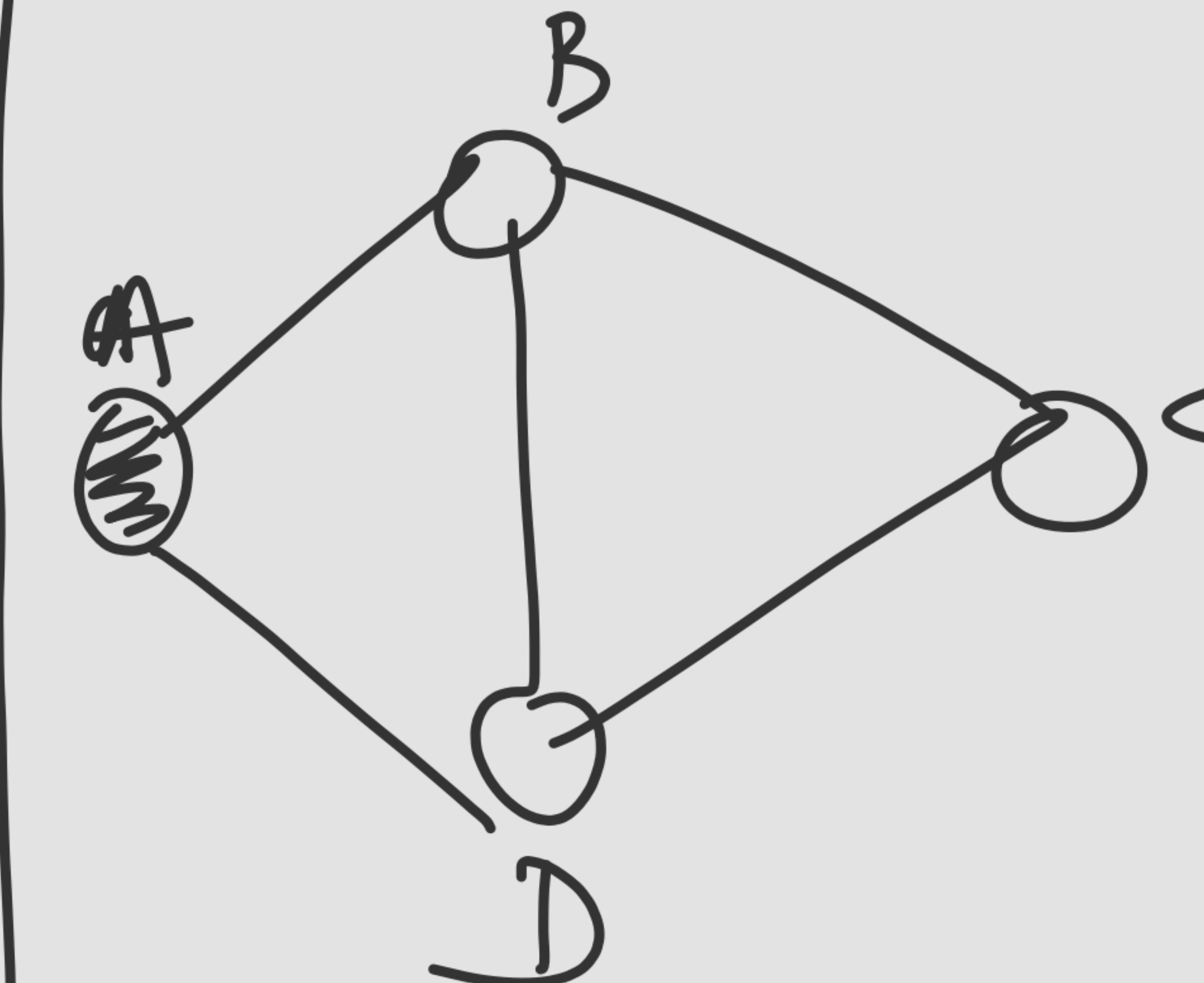
$$= O(v^2)$$

* reordering

* costly for sparse graphs

Adjacency List

- * Stacks - LIFO
- * Queues - RIFO
- * linked list

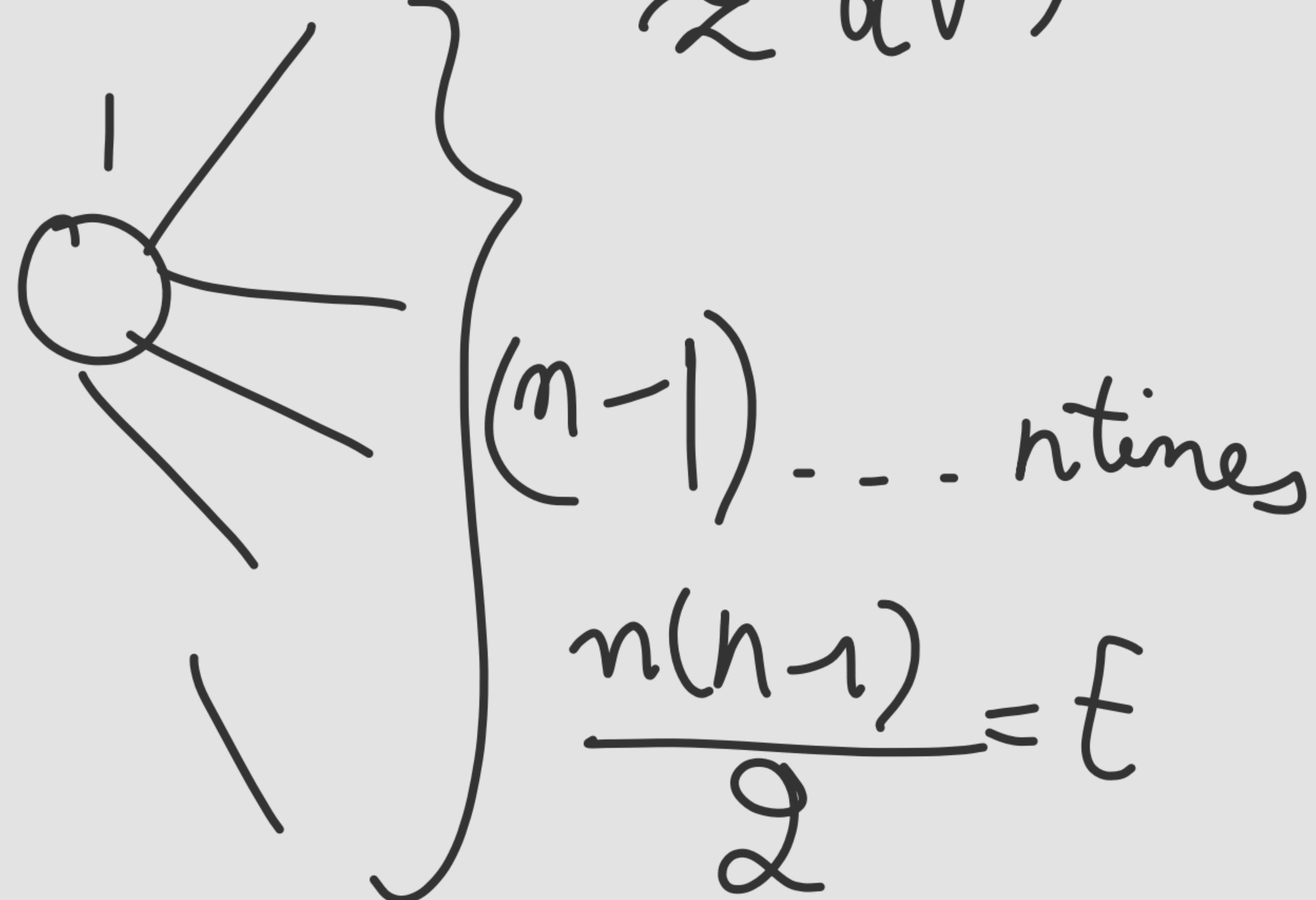


$$O(V + 2E) \approx O(N)$$

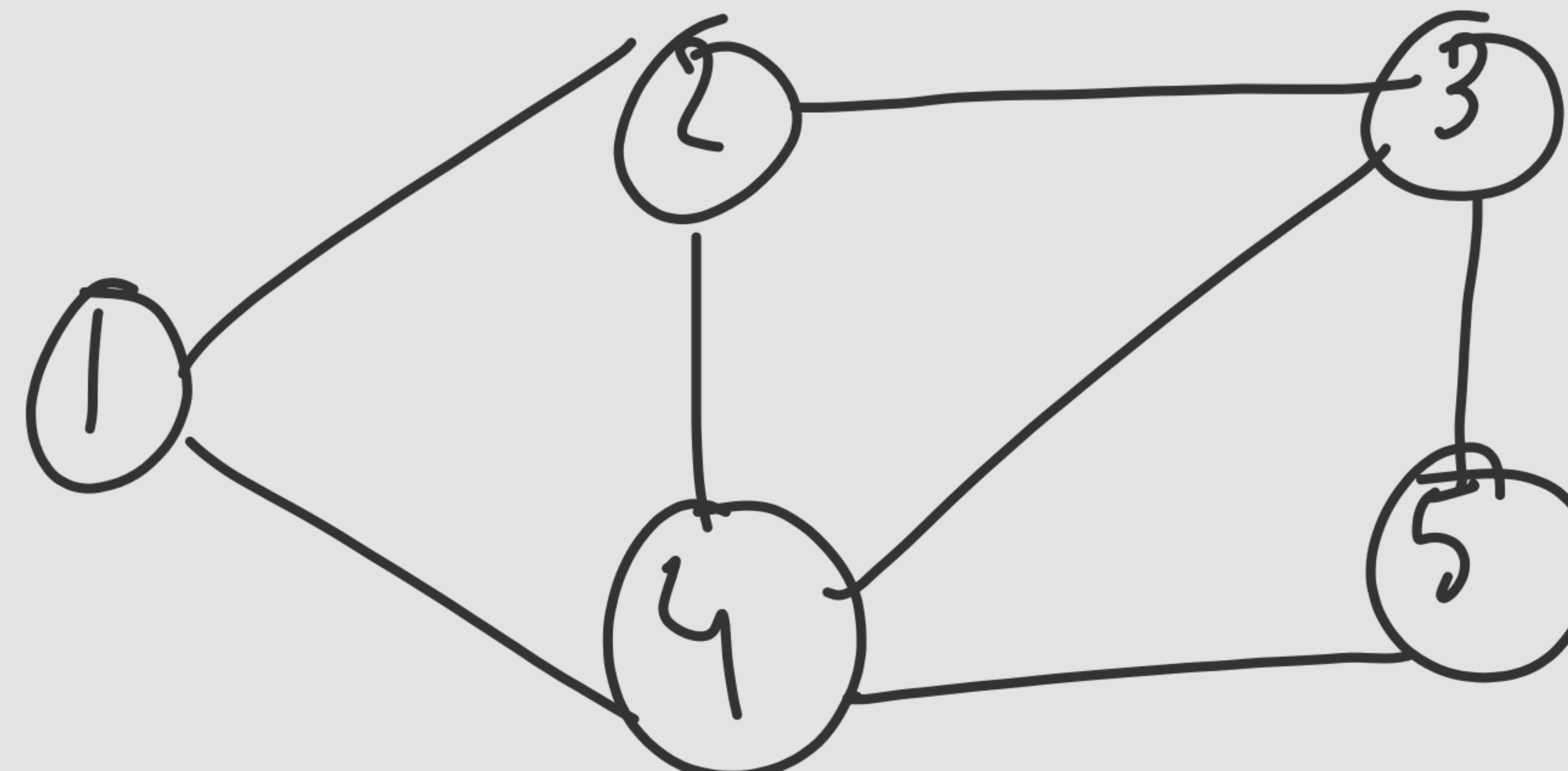
$O(v^2)$

$$E = \frac{v(v-1)}{2} \approx O(v^2)$$

$$O(\epsilon v) \approx O(v^2)$$

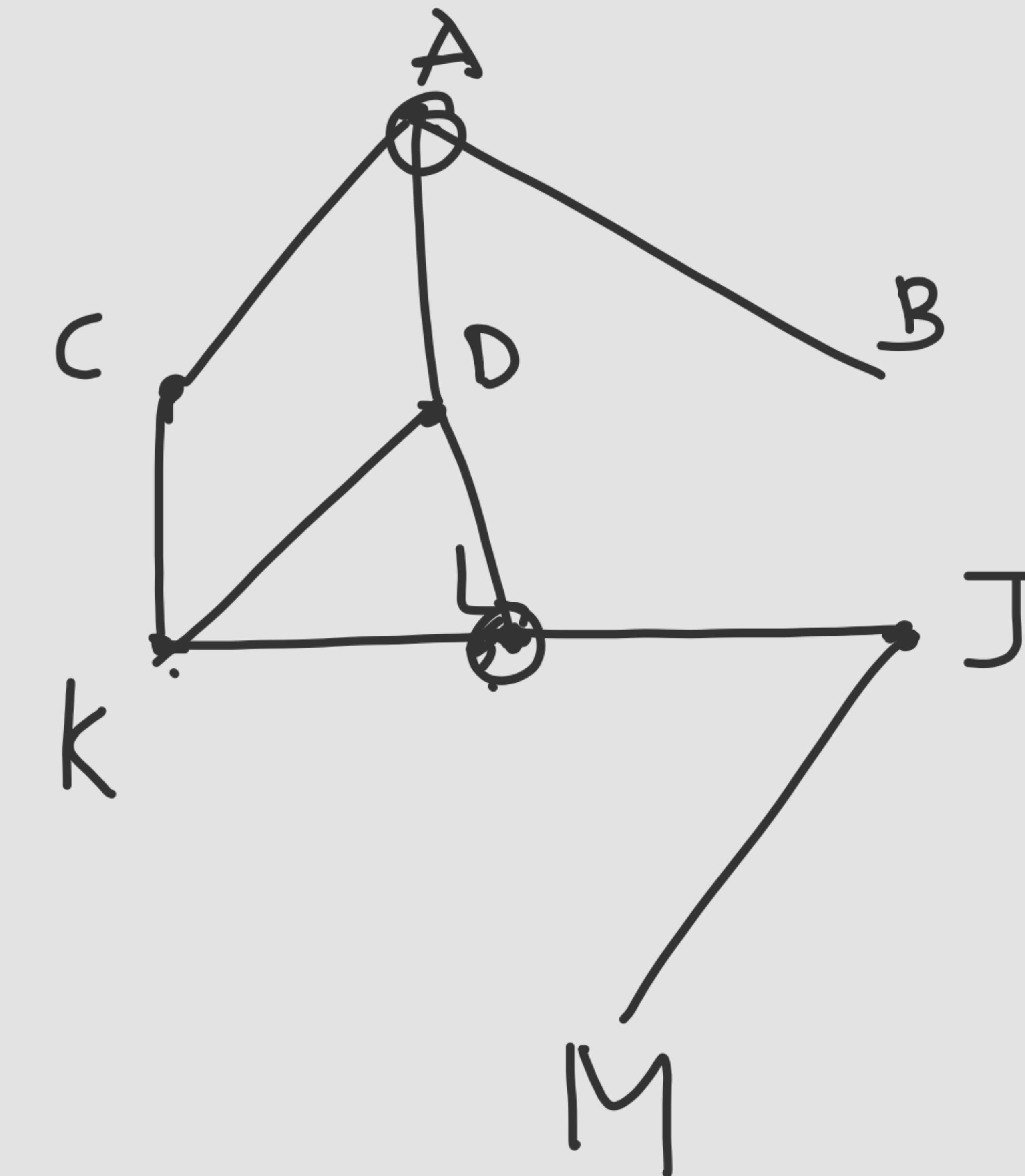


Adj. Matrix Vs Adj. List



Vertex	Adj. List
1	2, 4
2	1, 3, 4
3	2, 4, 5
4	1, 2, 3, 5
5	3, 4

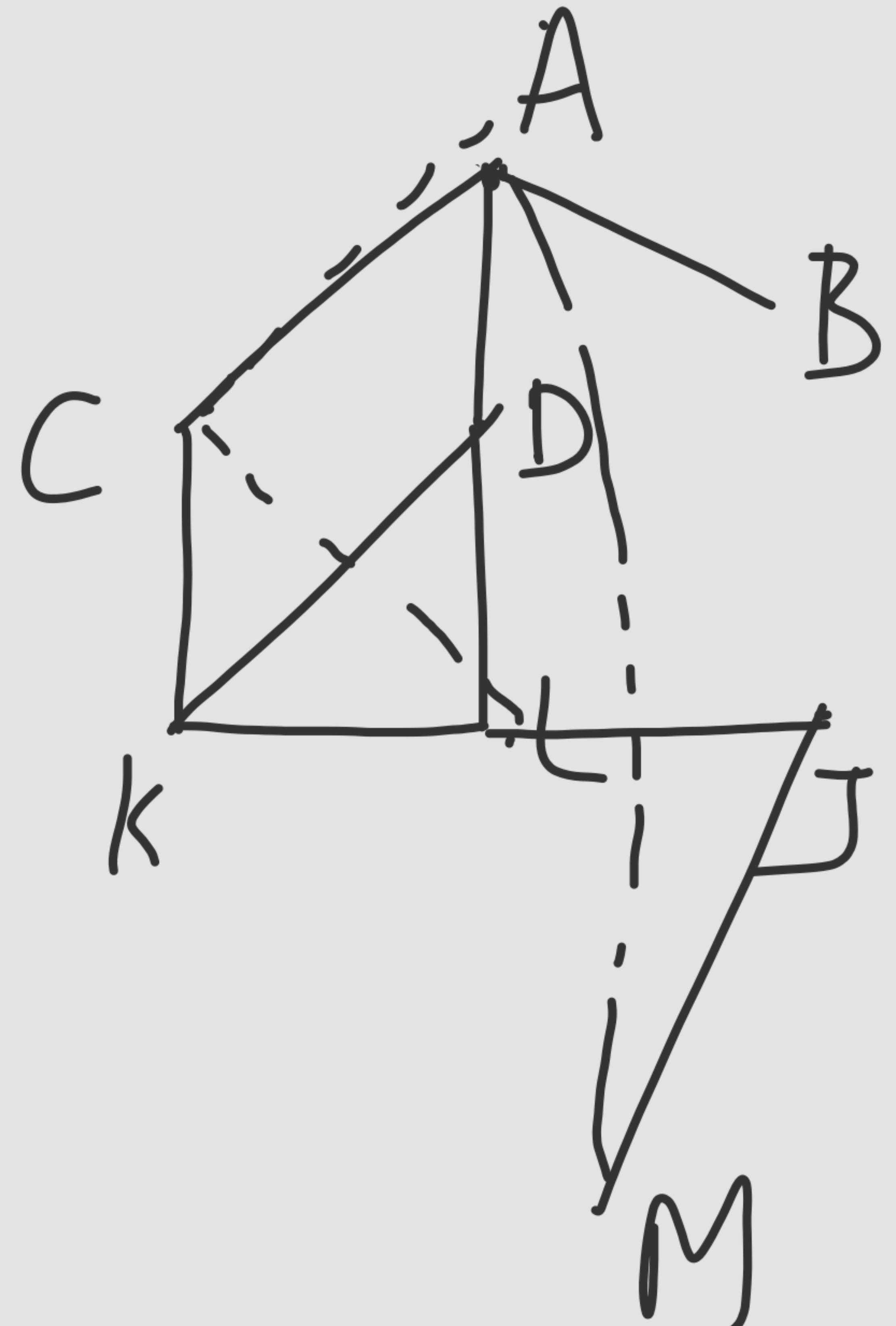
Depth First Search



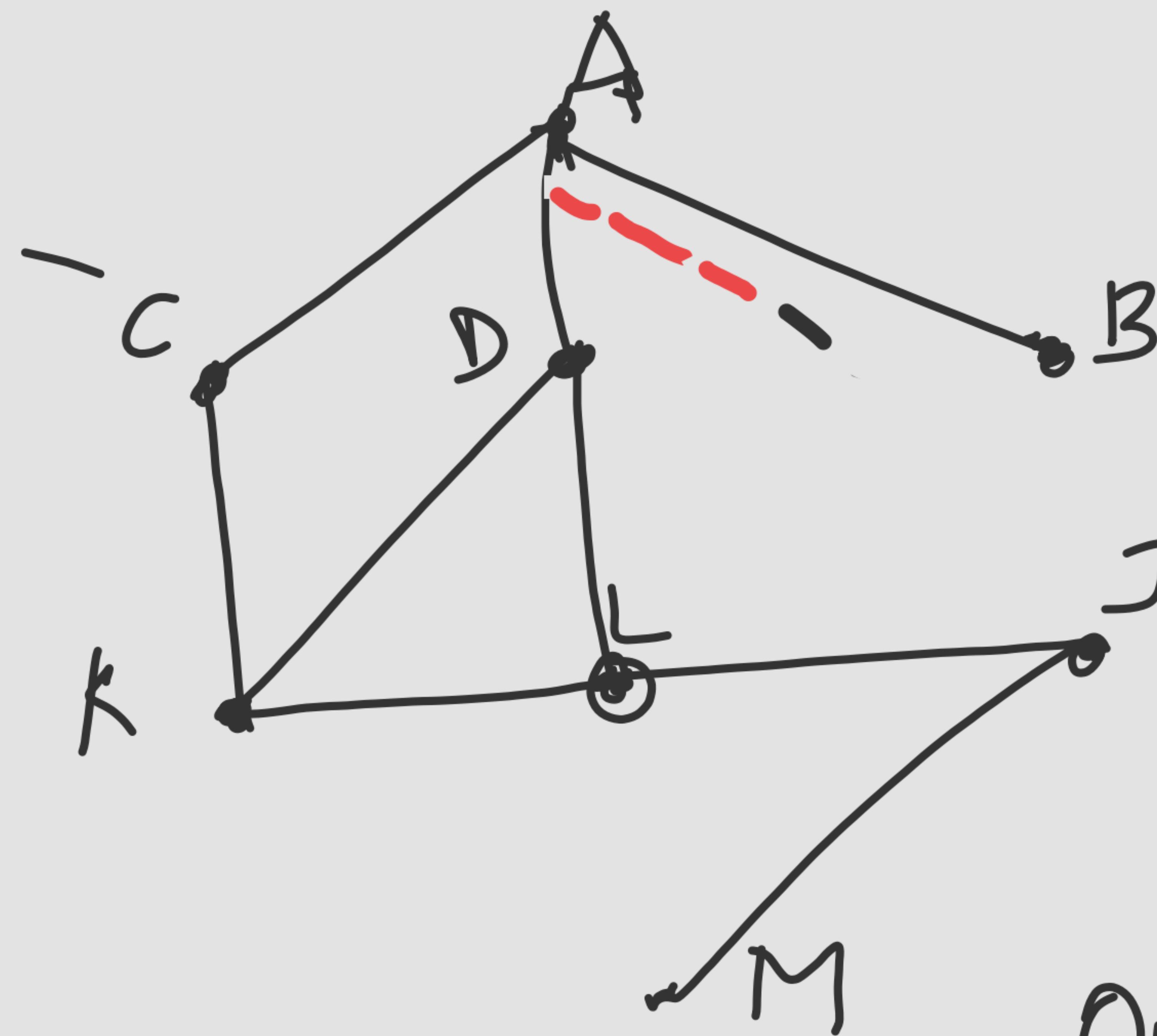
Adj List

??

Stack	Vertex	Status
A	A	T
D, C, B	D	T
L, K, C, B	L	T
K, J, K, C, B	K	T
C, J, B	C	T
J, B	J	T
M, B	M	T
B	B	T

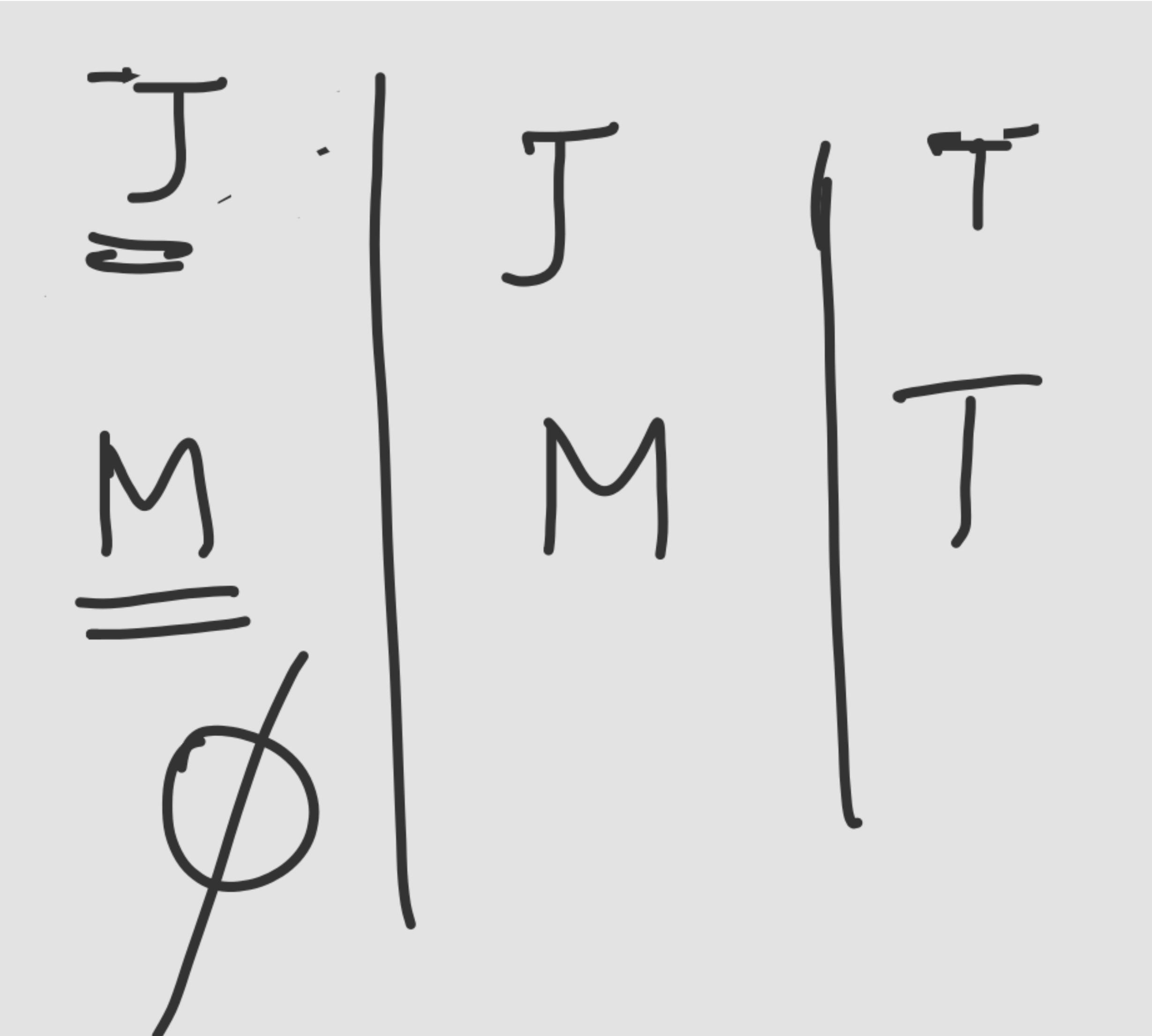


BFS



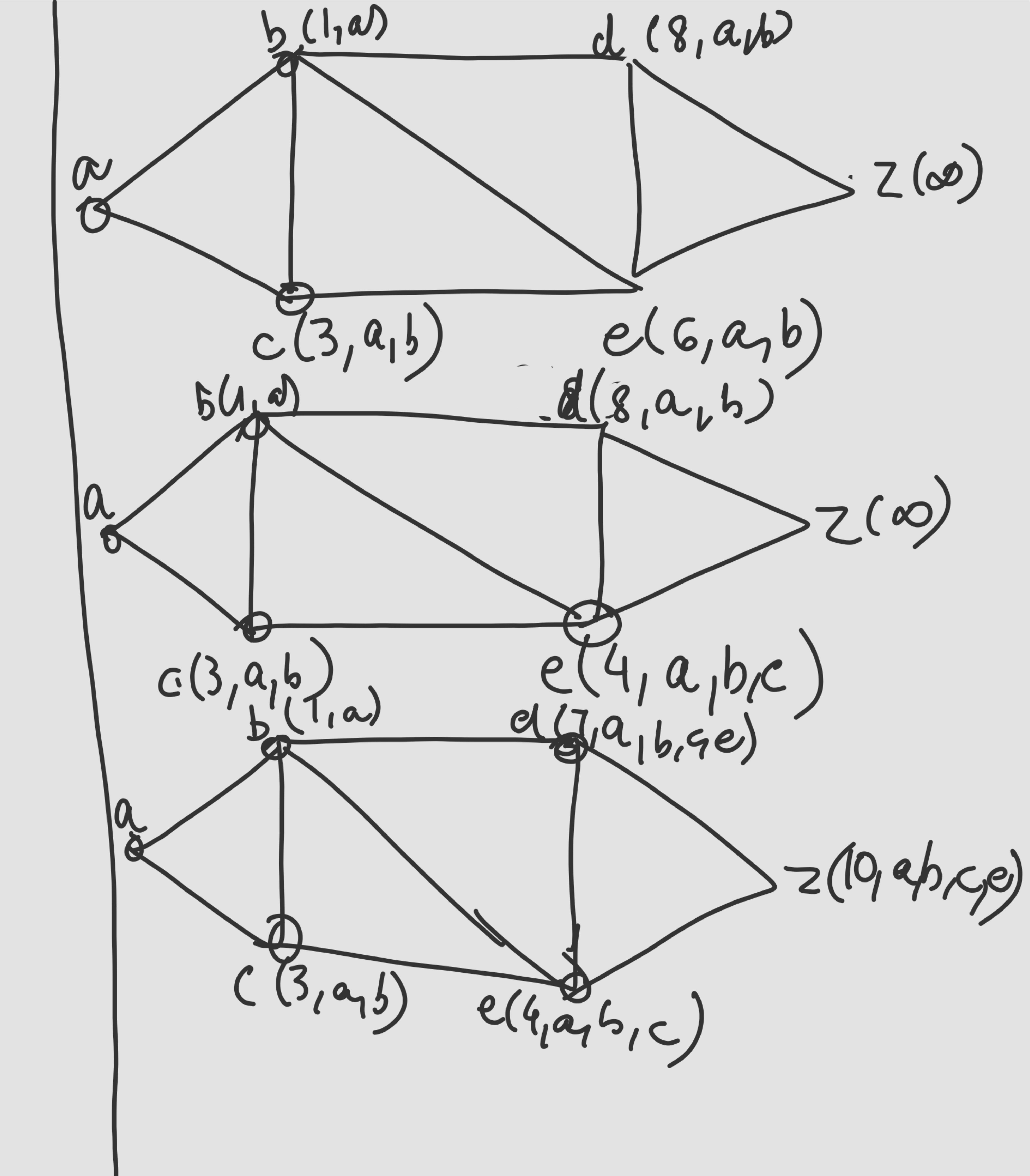
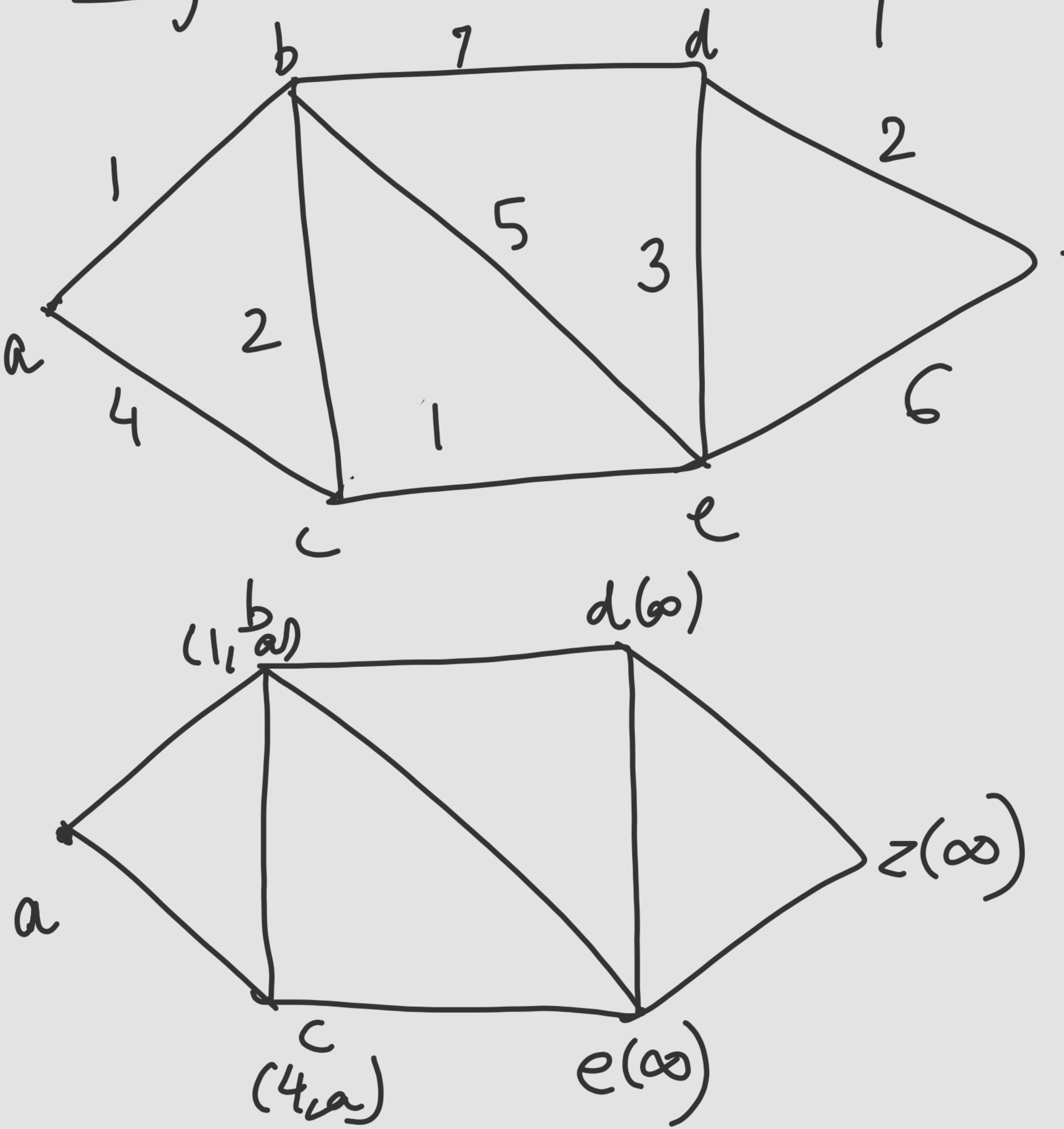
Vertex	Adj. List
A	B, C, F
B	A
C	A, K
D	A, K, L
E	L, M
F	D, L
G	J, K
H	J

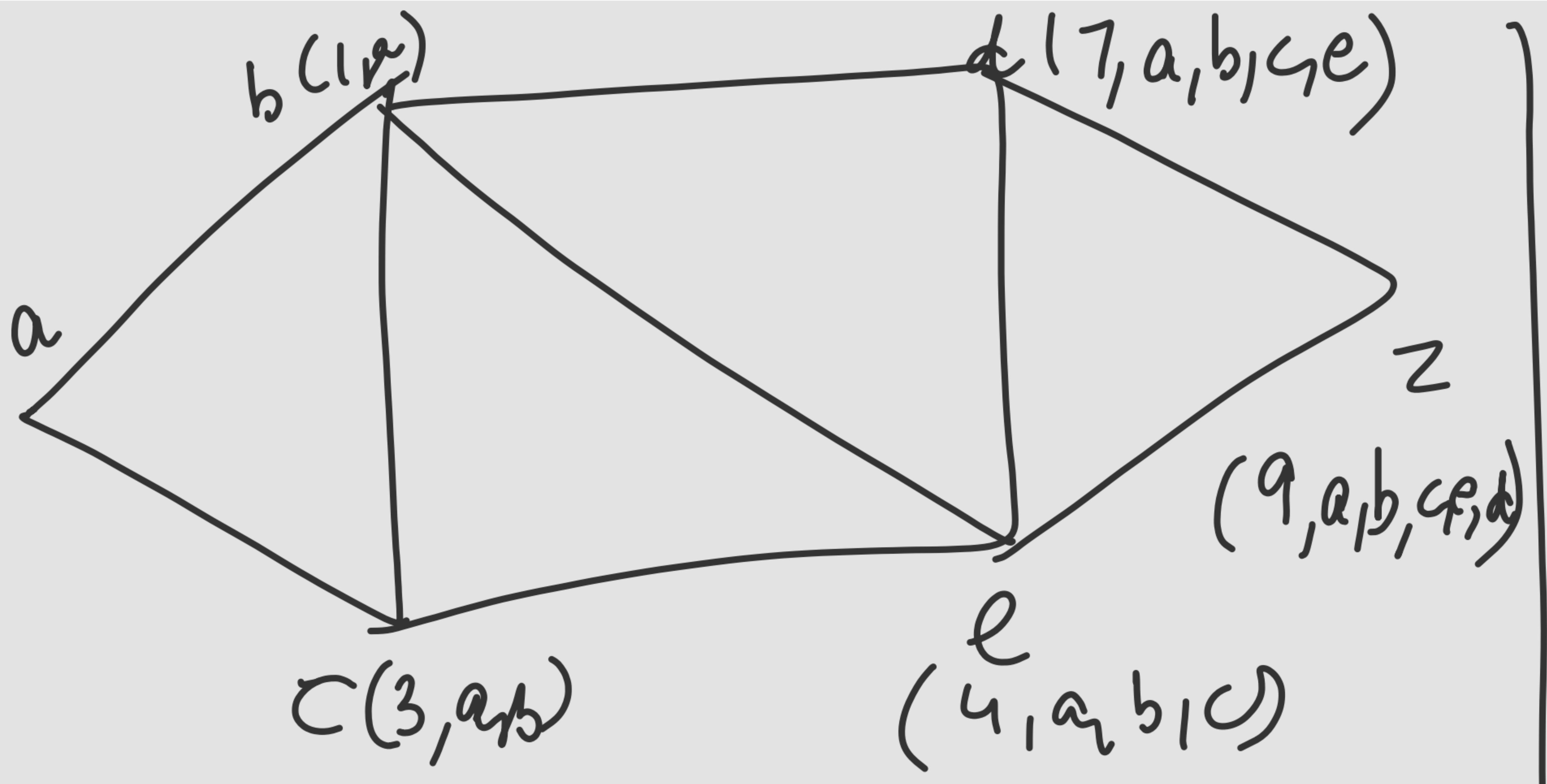
Queue	Vertex	Status (VISIT)
A	A	T
D, C, B	B	T
D, C, L	C	T
D, K, L	D	T
J	K	T
	L	T



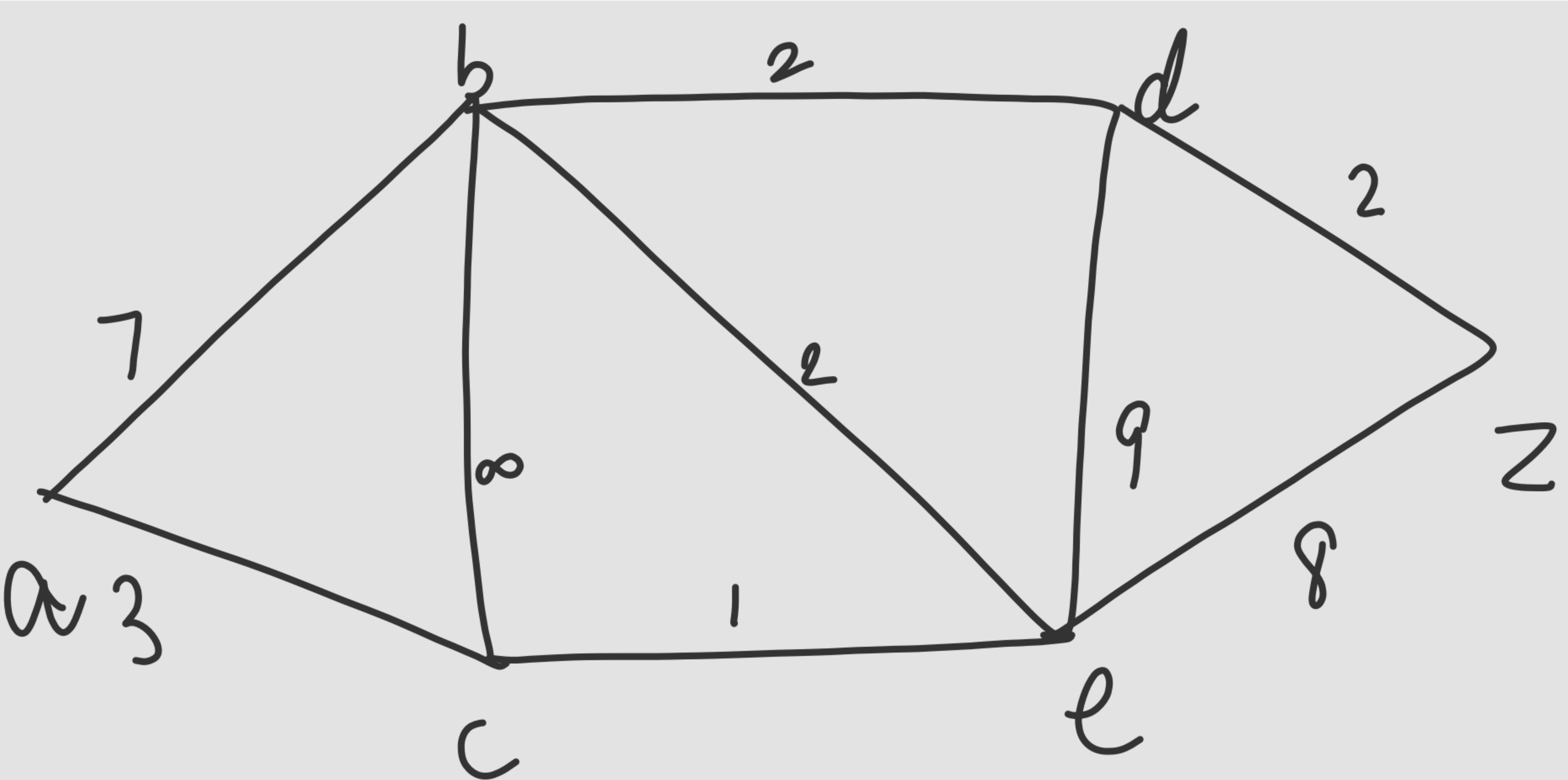
A, B, C, D, E, F, G, H
J, M, T, T

Dijkstra = Shortest path





lost = 9
 Path = { a, b, c, e, d, z }



$$\text{Cost} = 10$$

path = {a, c, b, d, z}

$$P = \{a\}$$

$$T = \{b, c, d, e, z\}$$

$$l(b) = 7$$

$$l(c) = 3$$

$$l(d) = \infty$$

$$l(e) = \infty$$

$$l(z) = \infty$$

Iteration 1

$$P' = P \cup \{c\} = \{a, c\}$$

$$T' = T - \{c\} = \{b, d, e, z\}$$

$$l'(b) = \min [l(b), l(c) + w(c, b)] = \min [7, 3 + \infty] = 7$$

$$l'(d) = \min [l(d), l(c) + w(c, d)] = \min [\infty, 3 + \infty] = \infty$$

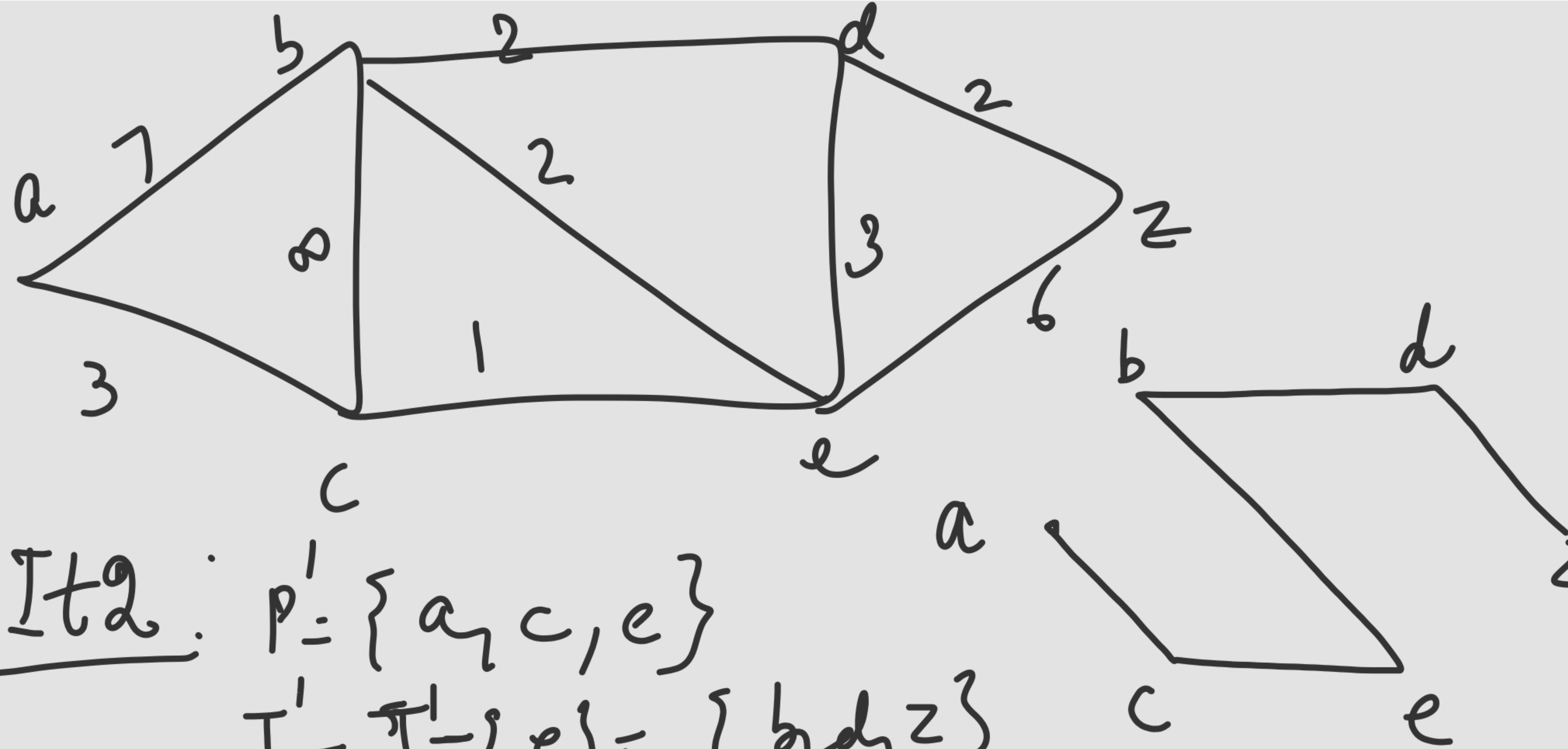
$$l'(e) = \min [l(e), l(c) + w(c, e)] = \min [\infty, 3 + \infty] = \infty$$

$$l'(z) = \min [l(z), l(c) + w(c, z)] = \min [\infty, 3 + \infty] = \infty$$

It 2

$$P = \{a, c, e\}$$

$$T = \{b, d, z\}$$



$$\text{It 2: } P' = \{a, c, e\}$$

$$T' = T - \{e\} = \{b, d, z\}$$

Assign all $l'(v)$ assign to $L(v)$

$$l'(b) = \min [l(b), l(e) + w(e, b)]$$

$$= \min [7, 4 + 2] = 6$$

$$l'(d) = \min [l(d), l(e) + w(d, e)]$$

$$= \min [\infty, 4 + 6] = 10$$

$$l'(z) = \min [l(z), l(e) + w(e, z)] = \min [\infty, 4 + 3]$$

$$= 12$$

It 3: $P' = \{a, c, e, b\}$

$$T' = \{d, z\}$$

Assign all $l'(v)$ to $L(v)$

$$l'(d) = \min [l(d), l(b) + w(b, d)]$$

$$= 8$$

$$l'(z) = \min [l(z), l(b) + w(b, z)]$$

$$= 12$$

It 4: $P' = \{a, c, e, b, d\}$

$$T' = \{z\}$$

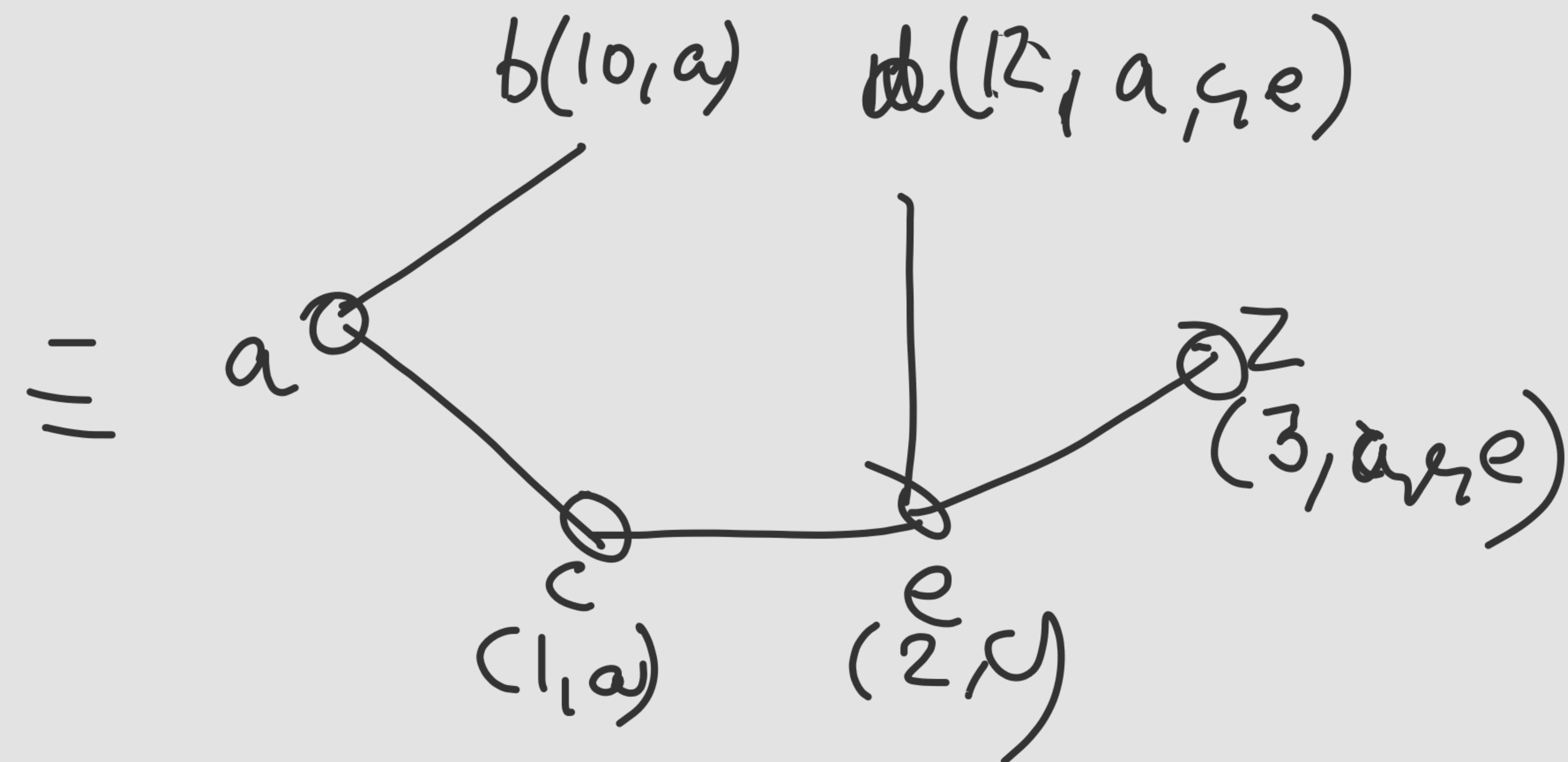
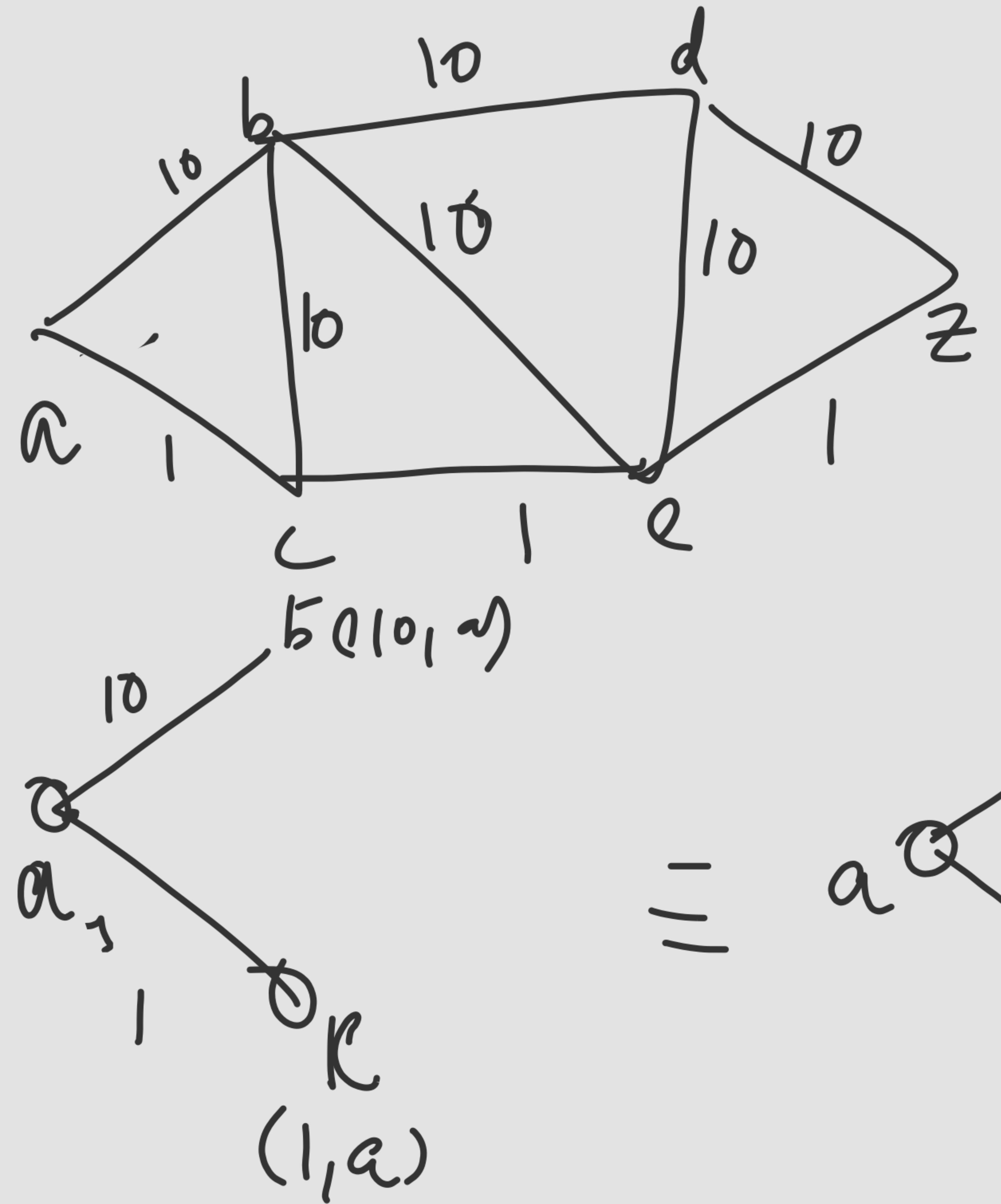
$$l'(z) = \min [l(z), l(d) + w(d, z)]$$

$$= \min [12, 8 + 2] = 10$$

It 5: $P' = \{a, c, e, b, d, z\}$

Total

Ques



Does Dijkstra
gives →

Single source SP

All pair SP