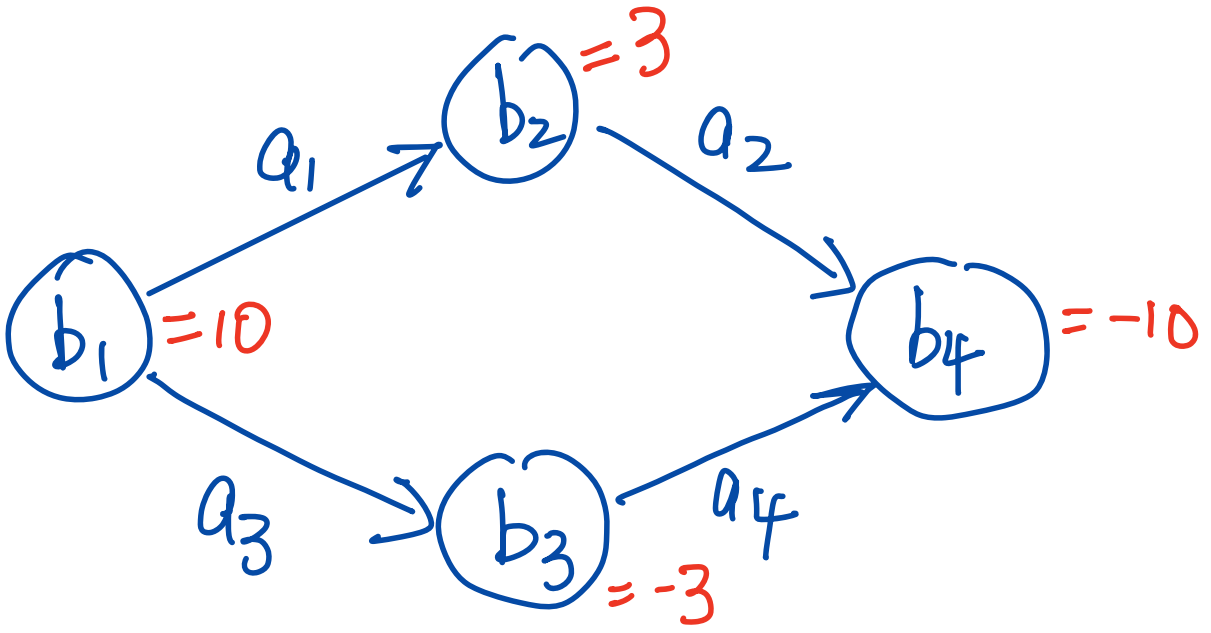
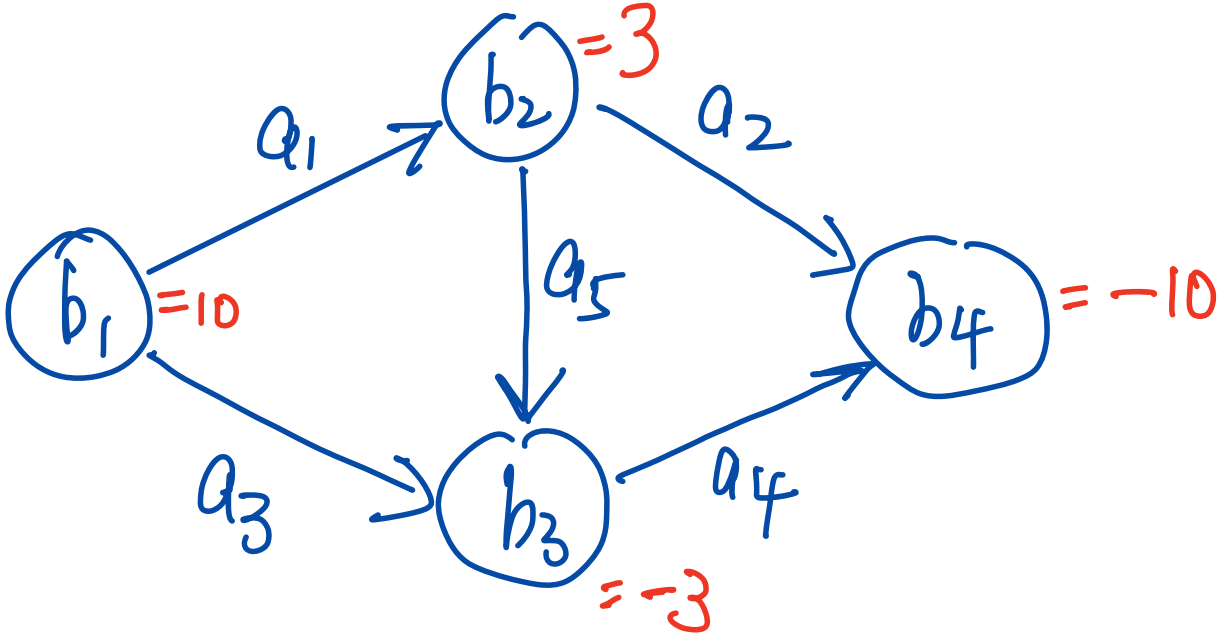
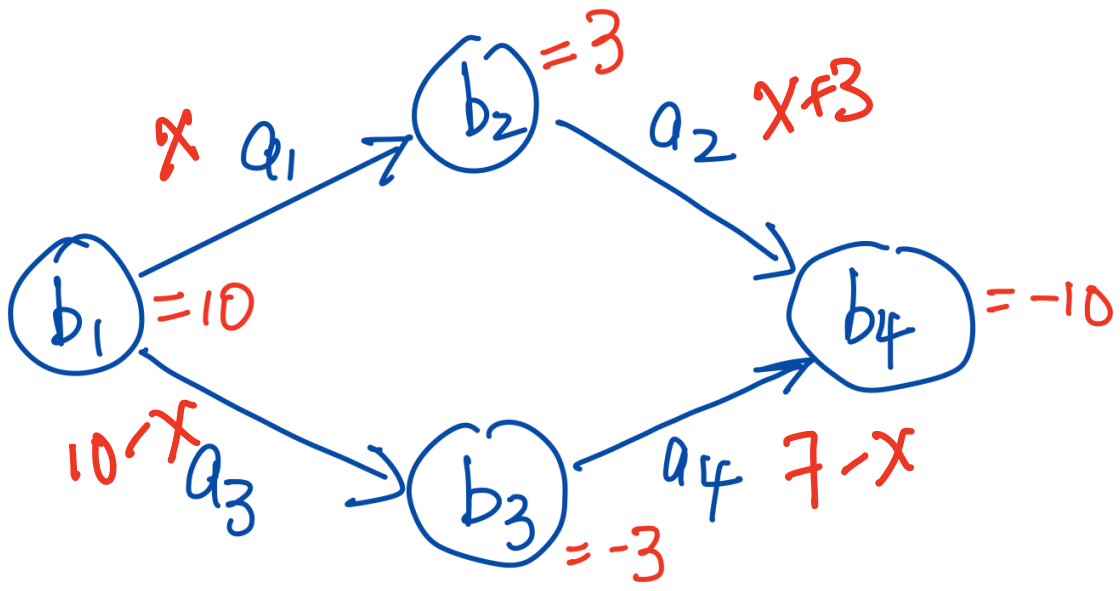
Transshipment Problem







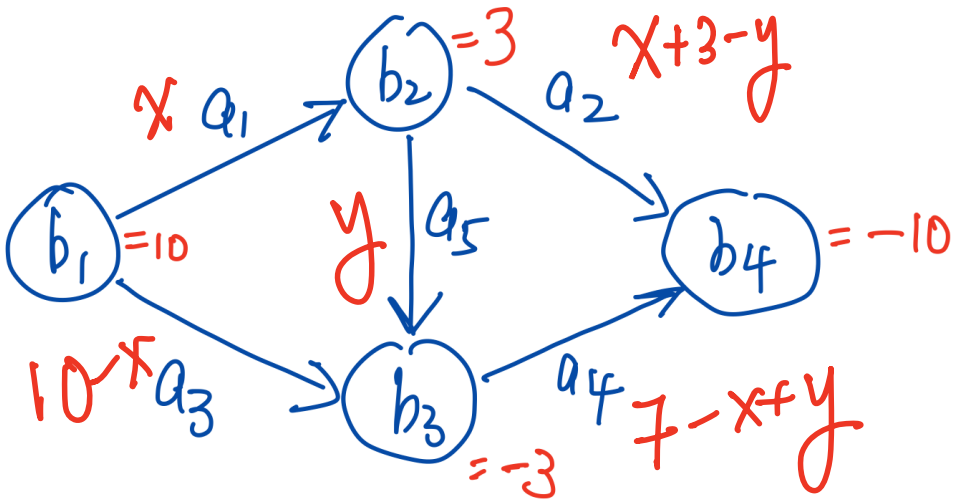
$$\min \quad a_1 x + a_2(x+3) + a_3(10-x) + a_4(7-x)$$

$$= (a_1 + a_2 - a_3 - a_4)x + 3a_2 + 10a_3 + 7a_4$$

$$\text{s.t.} \quad \underbrace{x \geq 0,\ 10-x \geq 0,\ x+3 \geq 0,\ 7-x \geq 0}_{0 \leq x \leq 7}$$

Solution: If $a_1 + a_2 - a_3 - a_4 \geq 0$, then $x = 0$

If $a_1 + a_2 - a_3 - a_4 \leq 0$, then $x = 7$



x, y – unknowns.

$$\min \; a_1 x + a_2(x+3-y) + a_3(10-x) + a_4(7-x+y)$$

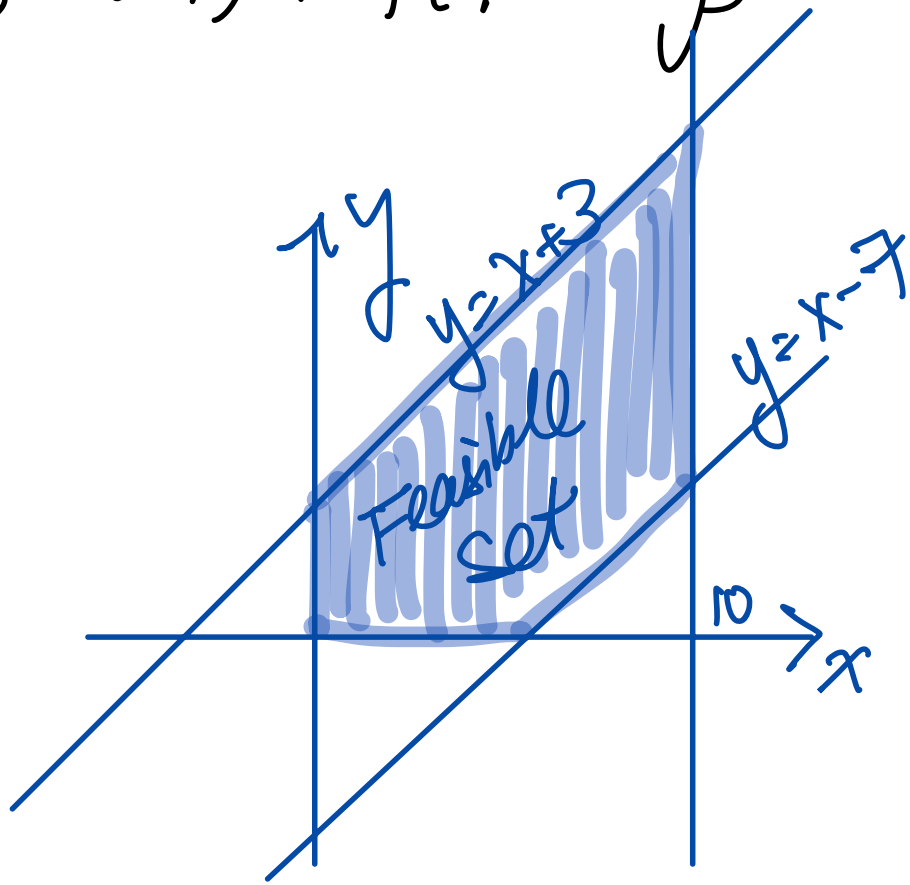
s.t.

$$\begin{cases} x \geq 0, \; 10-x \geq 0 \\ x+3-y \geq 0, \; y \geq 0 \\ 7-x+y \geq 0 \end{cases}$$

$$0 \leq x \leq 10$$

$$-3 \leq x-y \leq 7$$

$$y \geq 0$$



Find the max-flow and min cut

flow = 2 + 4 + 5

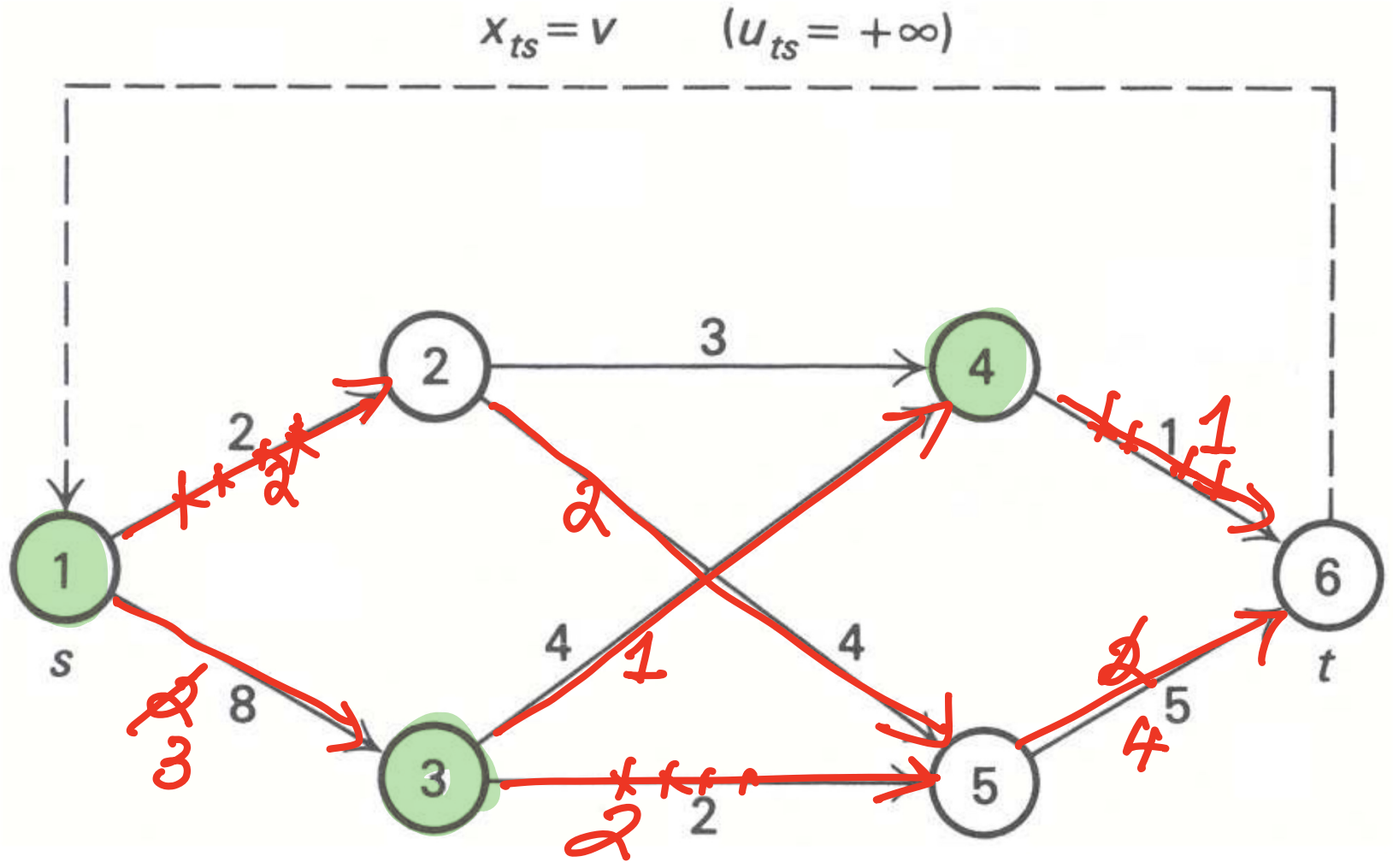
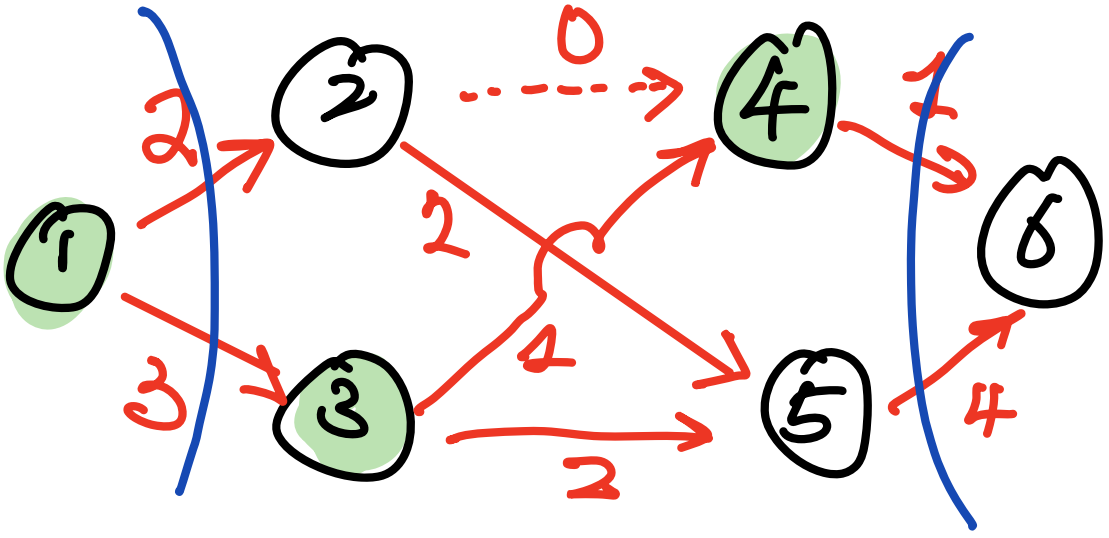


Figure 8.3

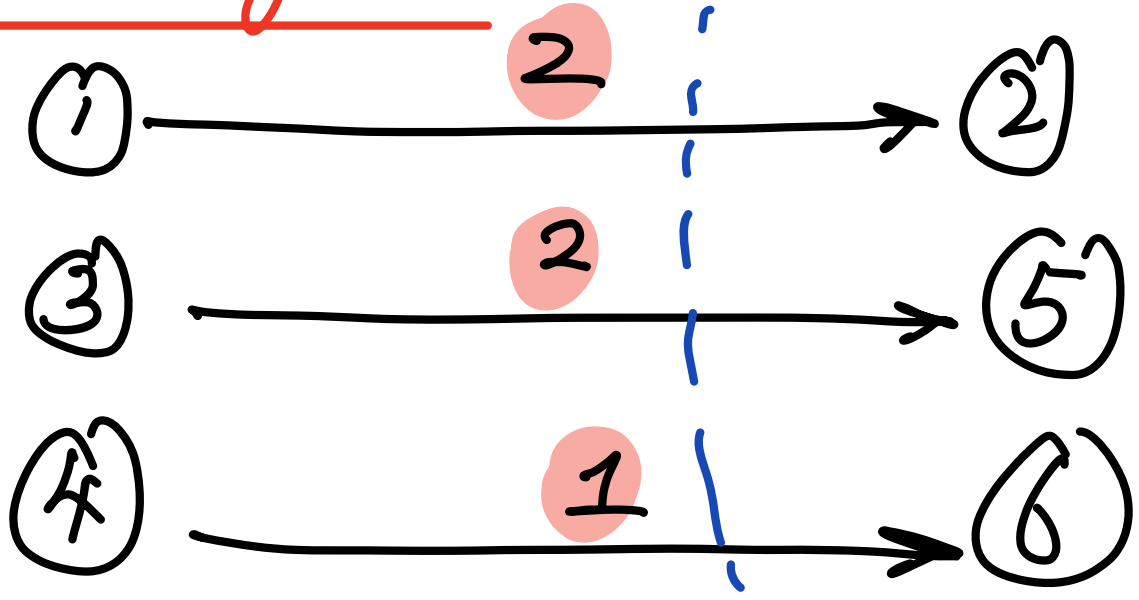
[BHM]

Find the max-flow and min cut



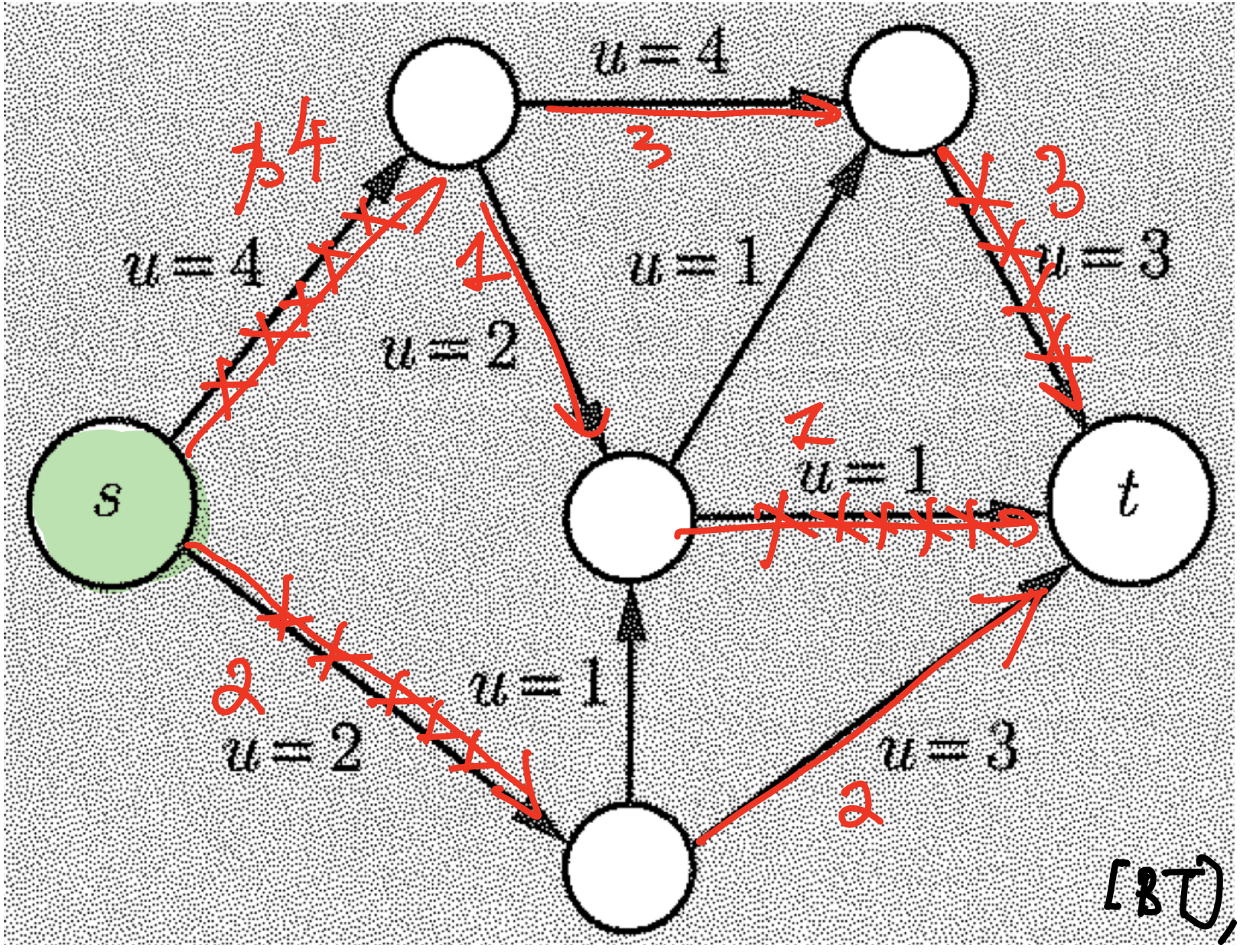
Max Flow = 5

Cut Flow Algorithm:



Find the max-flow and min cut

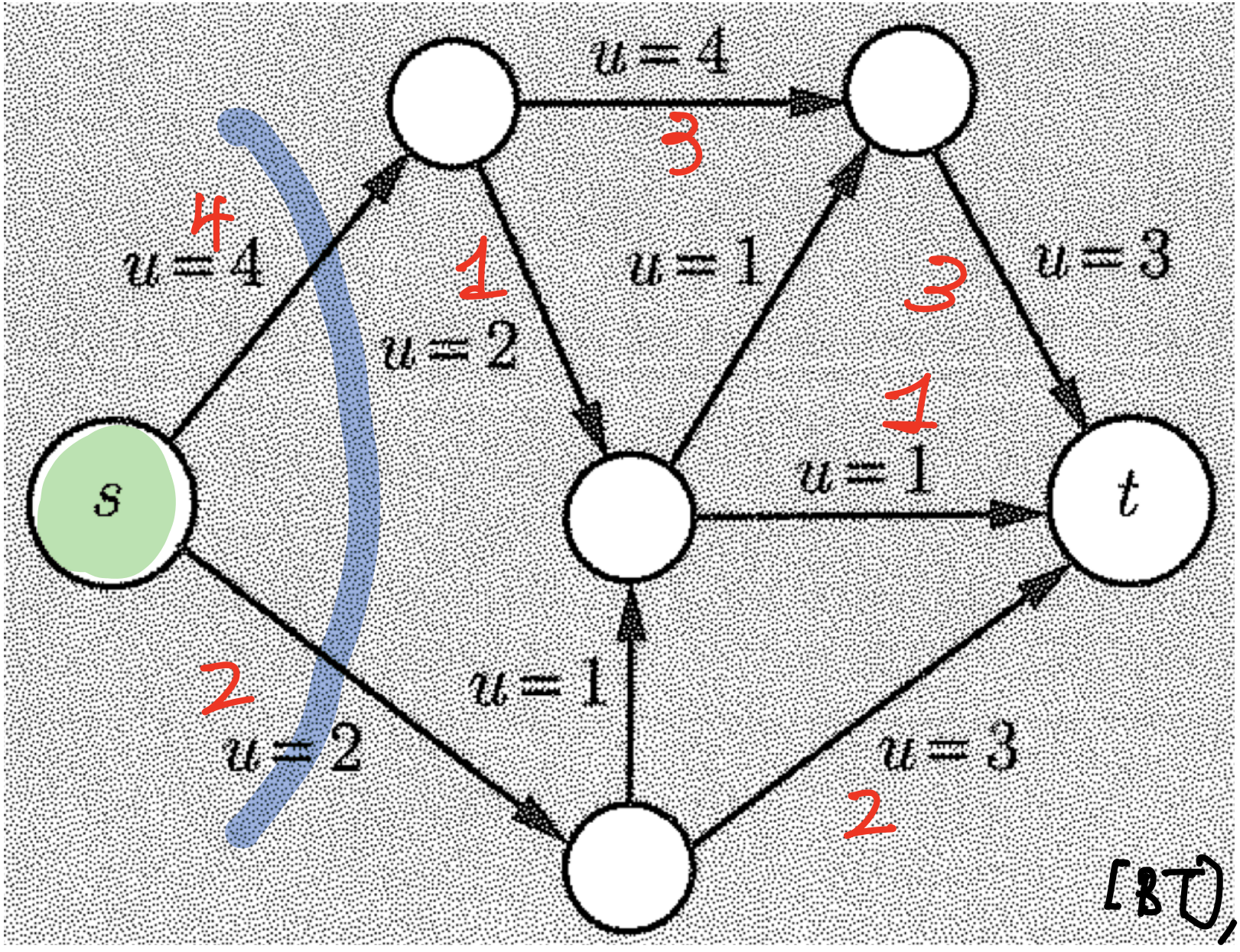
Flow = 2 + 6



[BT], p. 306

Find the max-flow and min cut

max flow = 6



[BT], p. 306

Find the max-flow and min cut

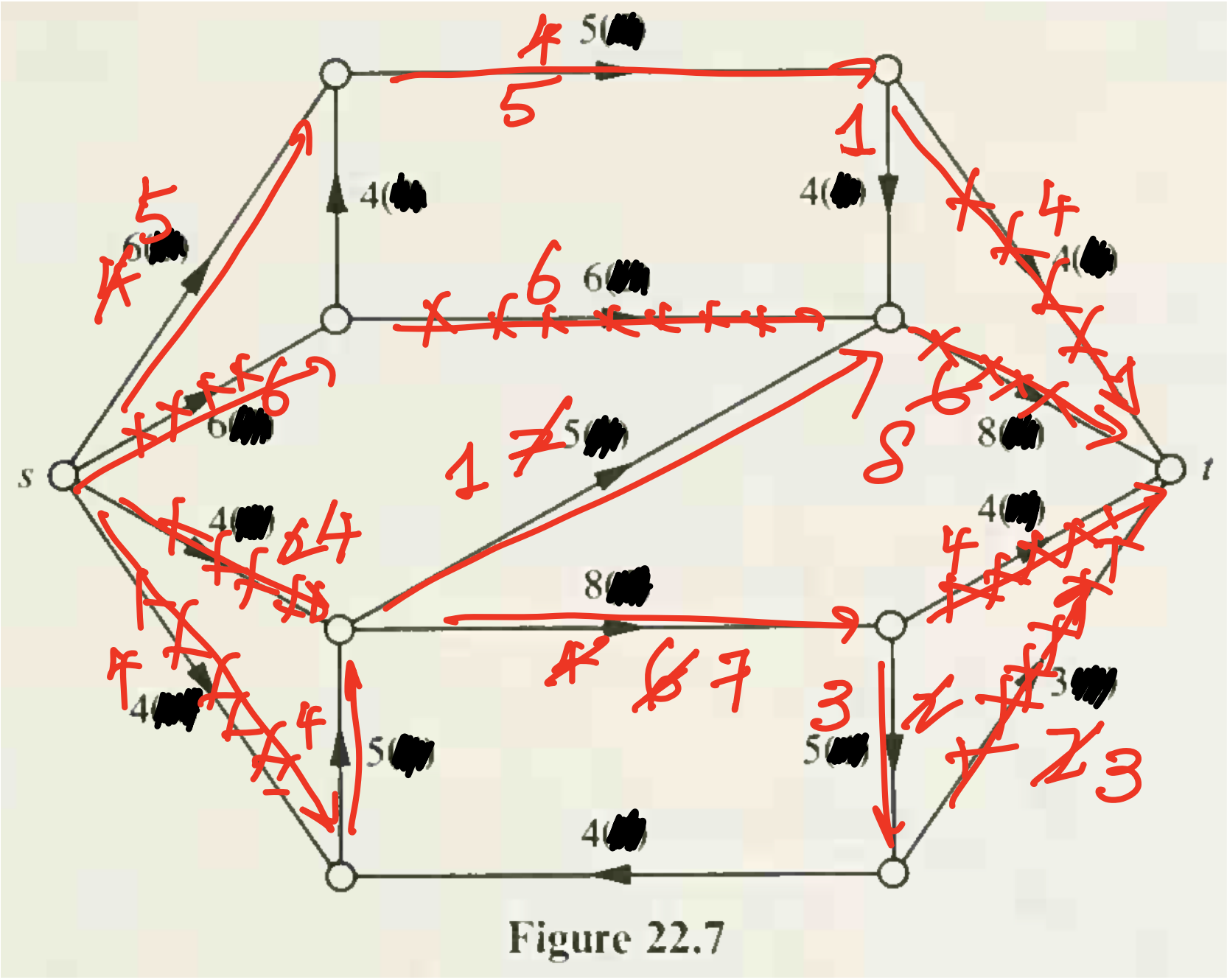


Figure 22.7

Find the max-flow and min cut

Max Flow = 19

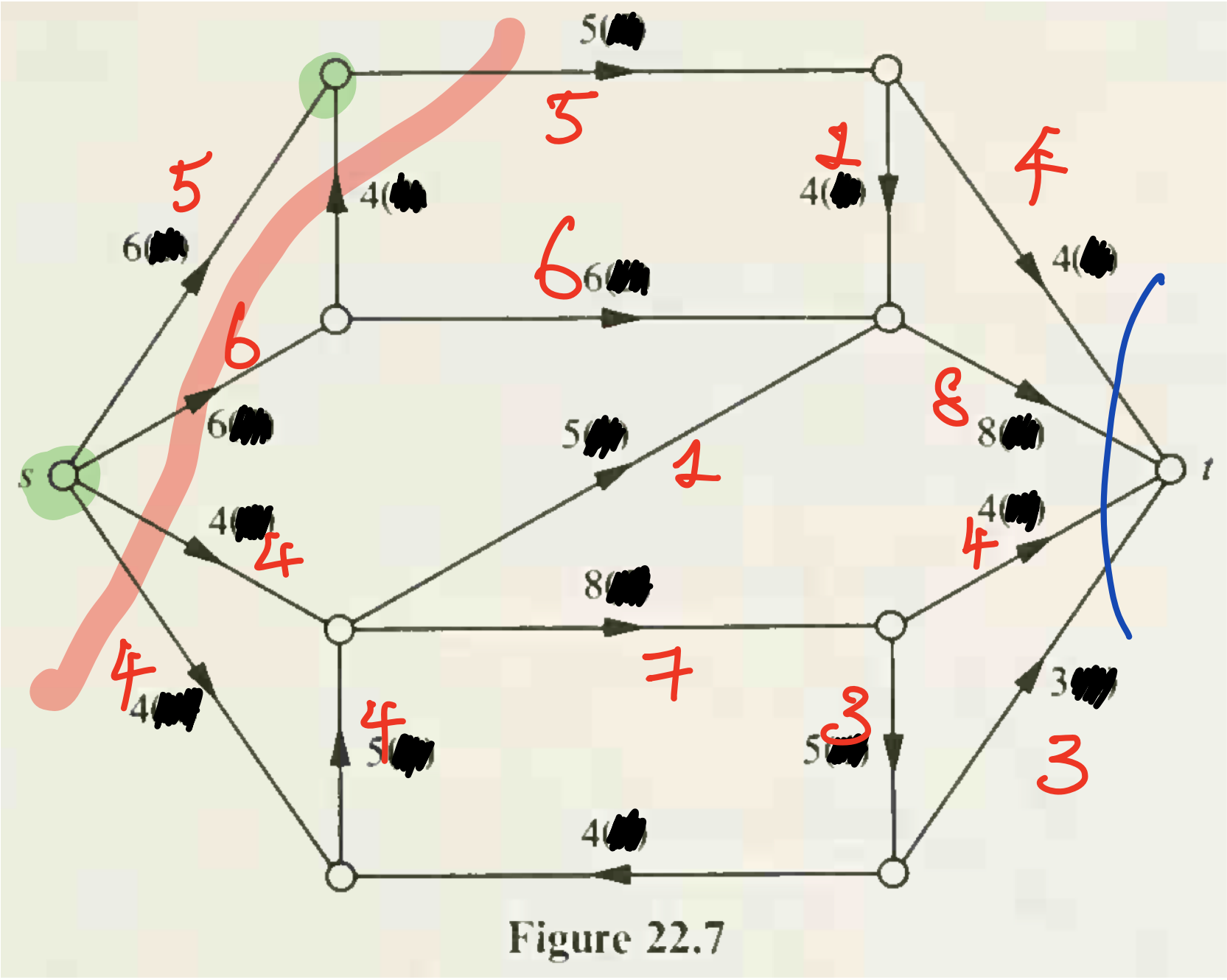


Figure 22.7

[9]

Find the max-flow and min cut

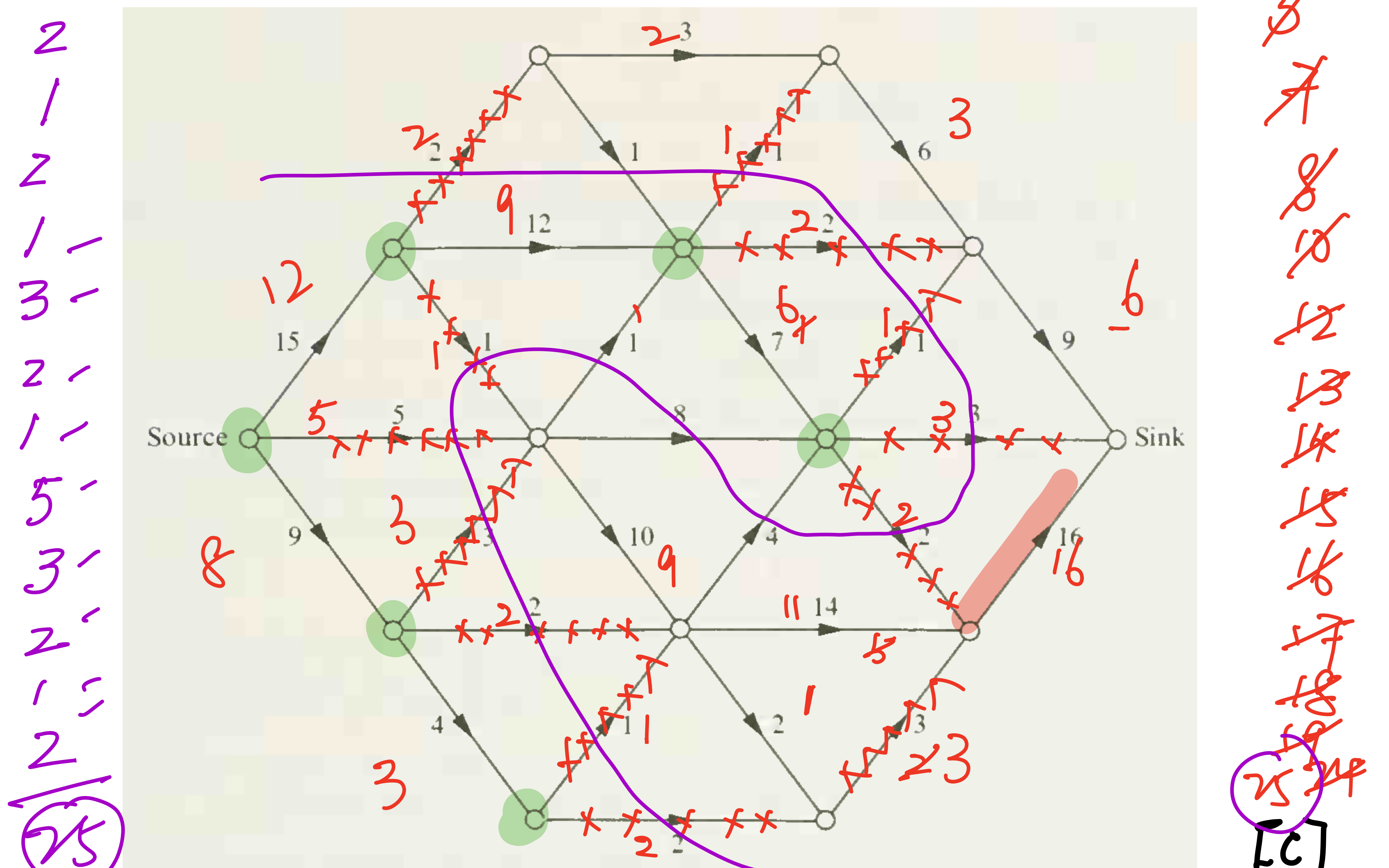


Figure 22.10

Find the max-flow and min cut

max flow = 25

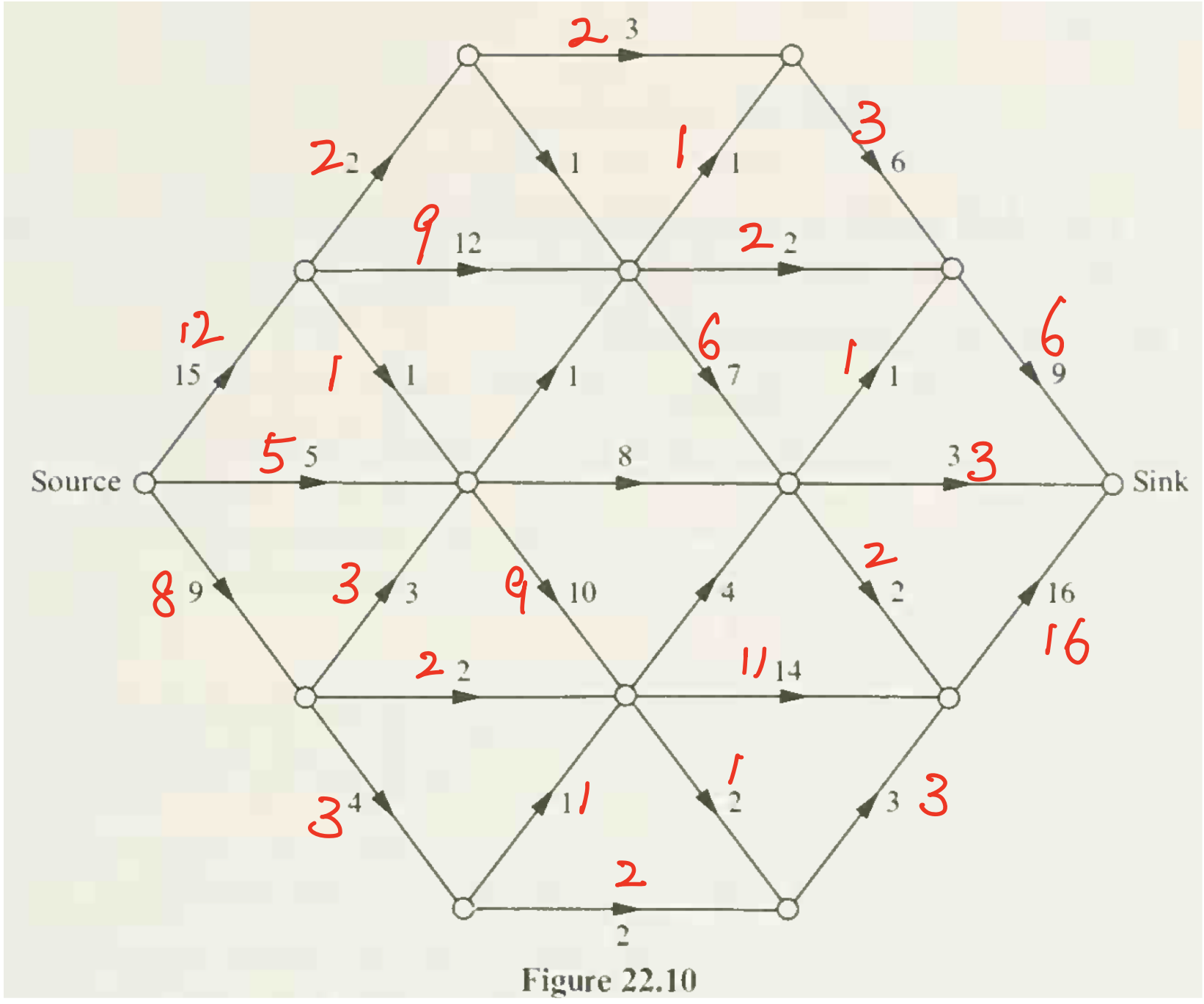


Figure 22.10

[c]

Find the Shortest Path

Dijkstra

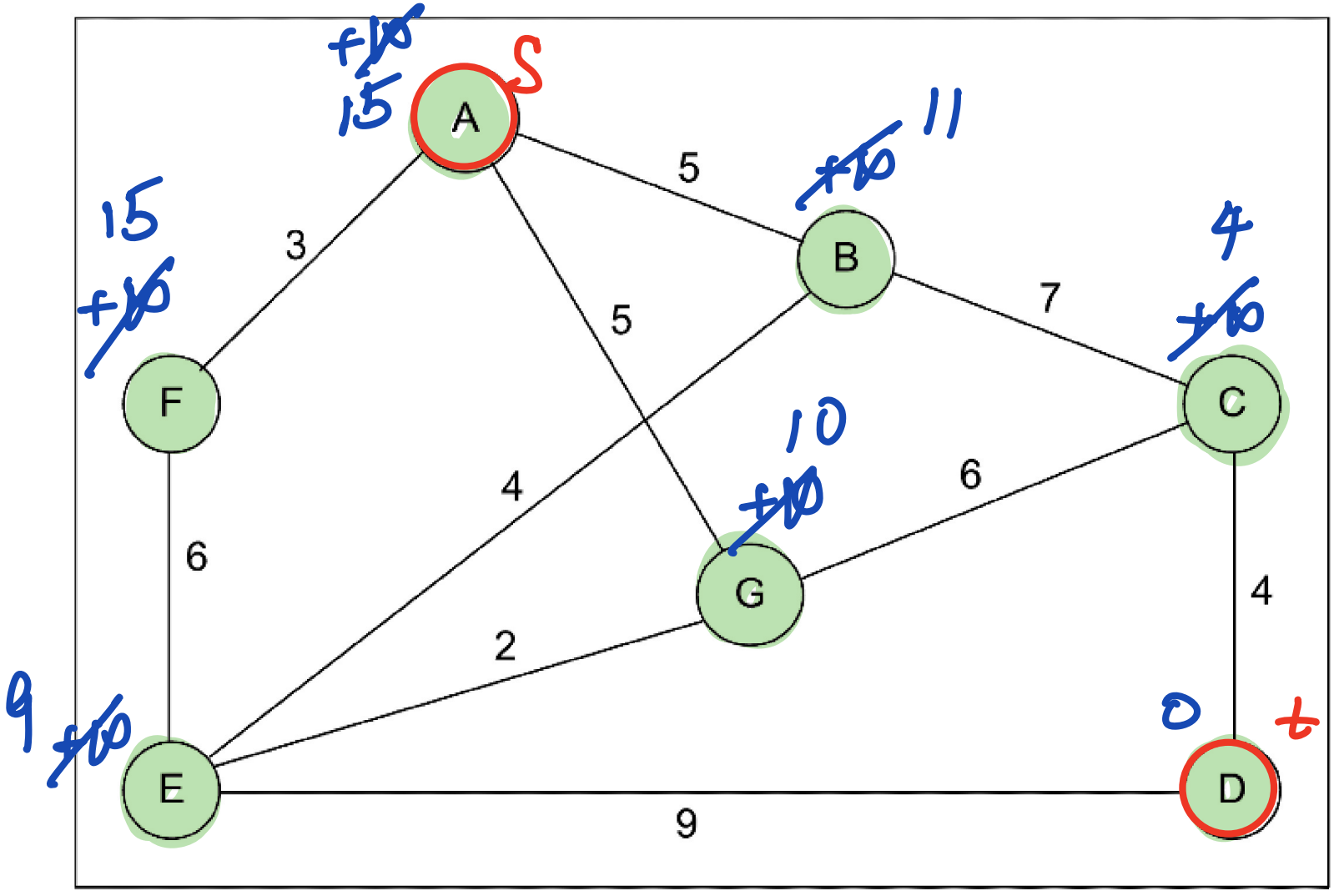


Fig. 1.1. The road network

[Sierksma– Ghosh]

Find the Shortest Path

Dijkstra

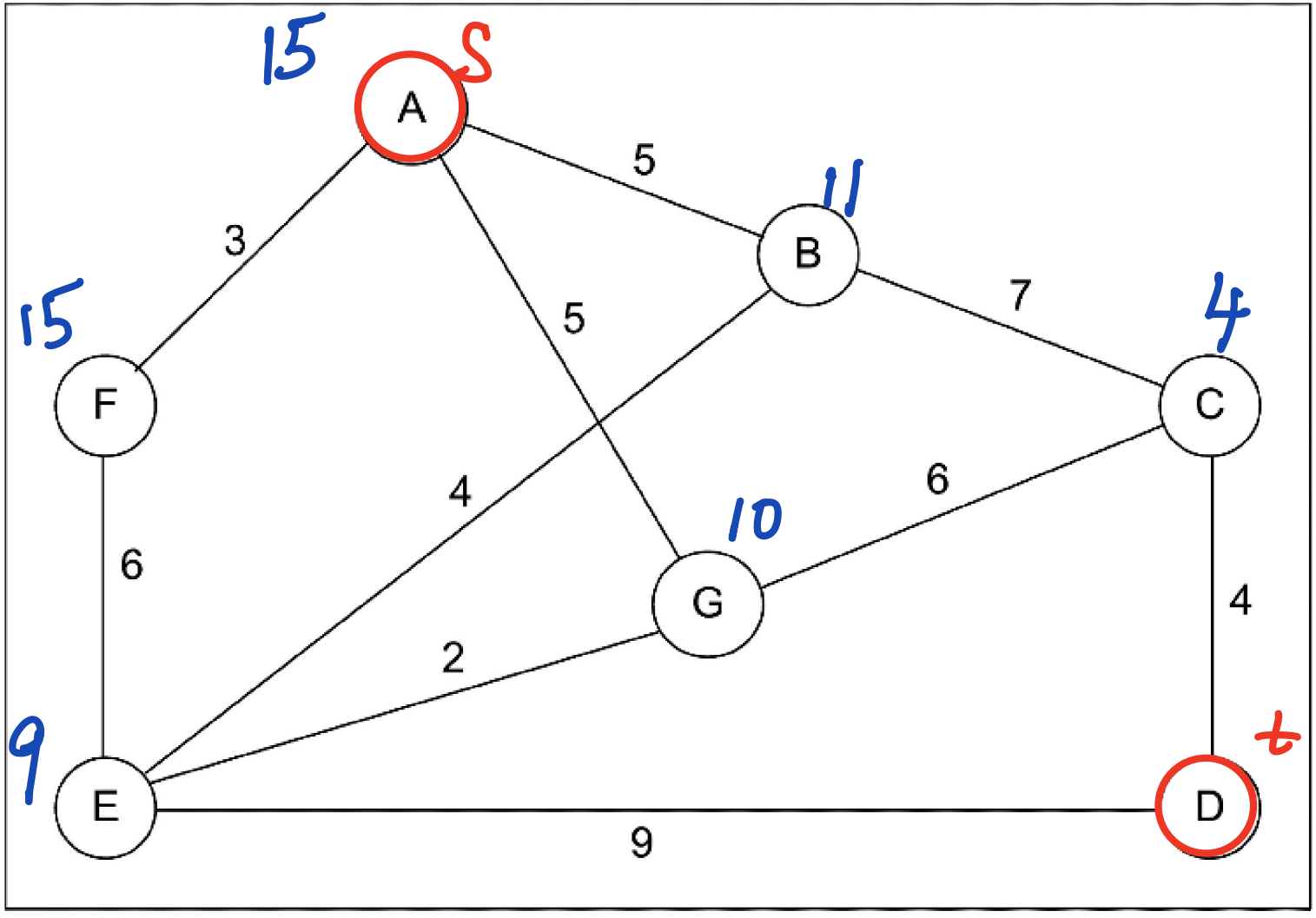


Fig. 1.1. The road network

[Sierksma– Ghosh]

Find the Shortest Path

Dijkstra

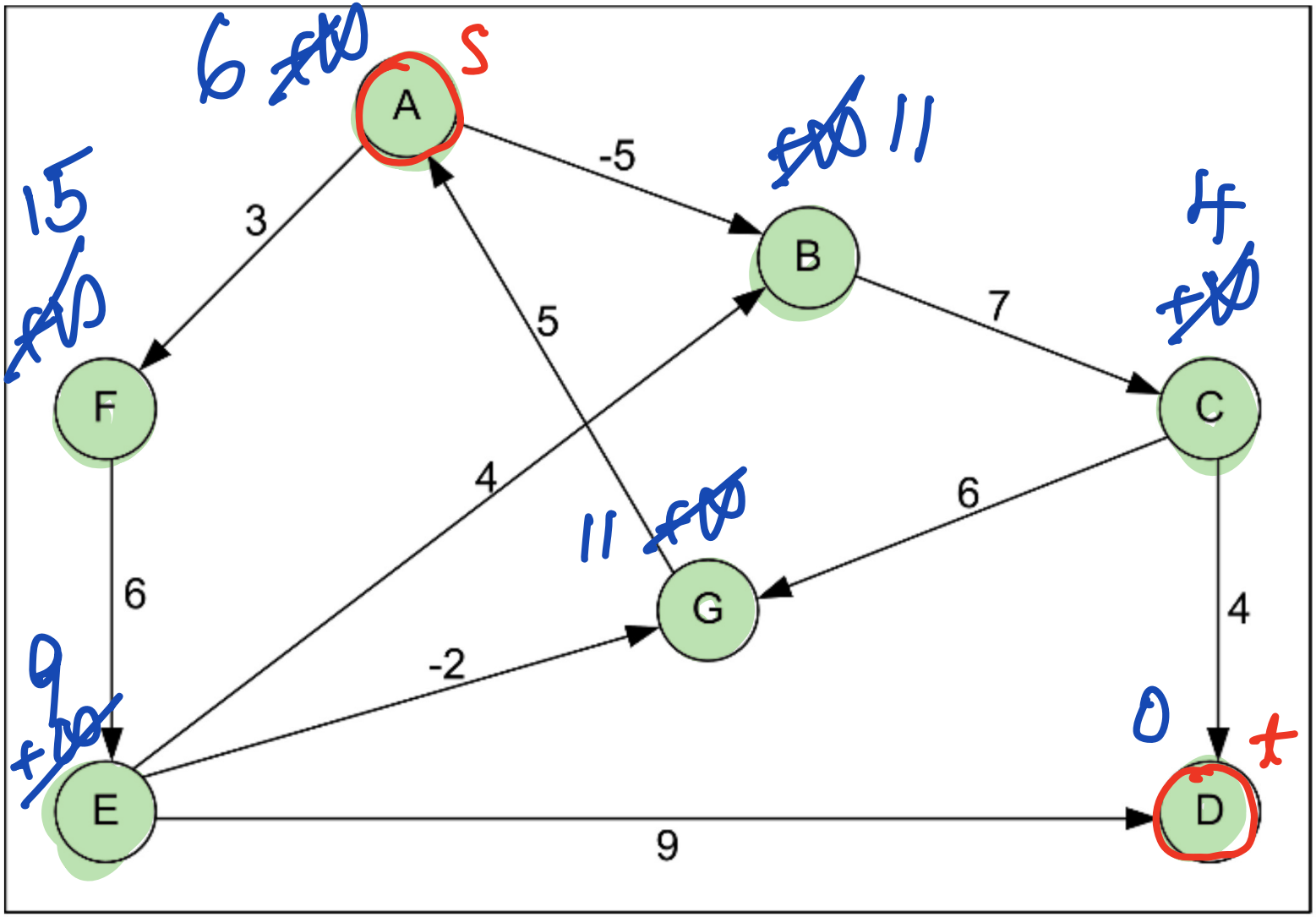


Fig. 1.9. A directed network with negative weight arcs

[Sierksma- Ghosh]

Find the Shortest Path

$$v_i^{k+1} = \min_j \{ c_{ij} + v_j^k \}$$

$v^{(1)}$ $v^{(2)}$ $v^{(3)}$ $v^{(4)}$

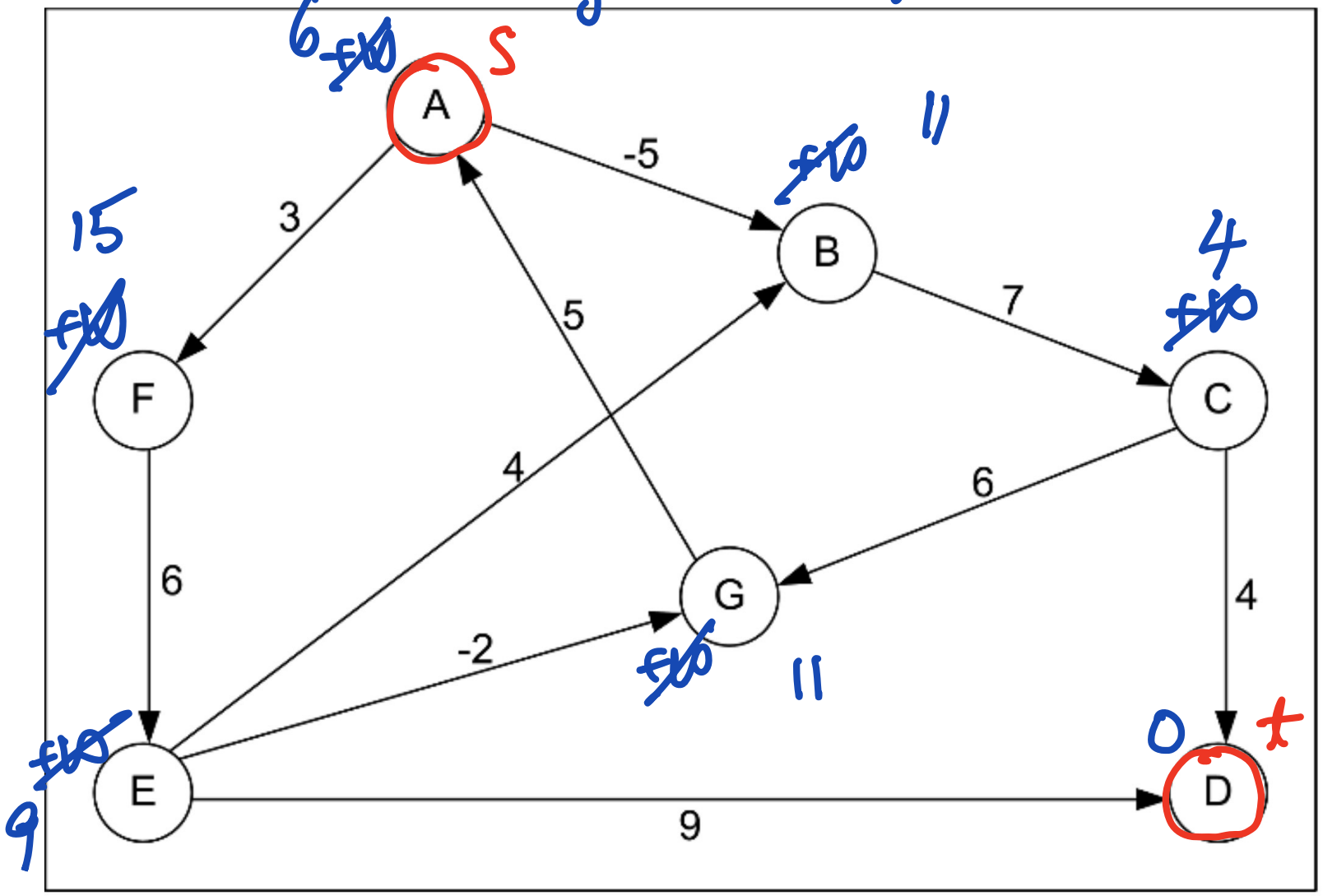
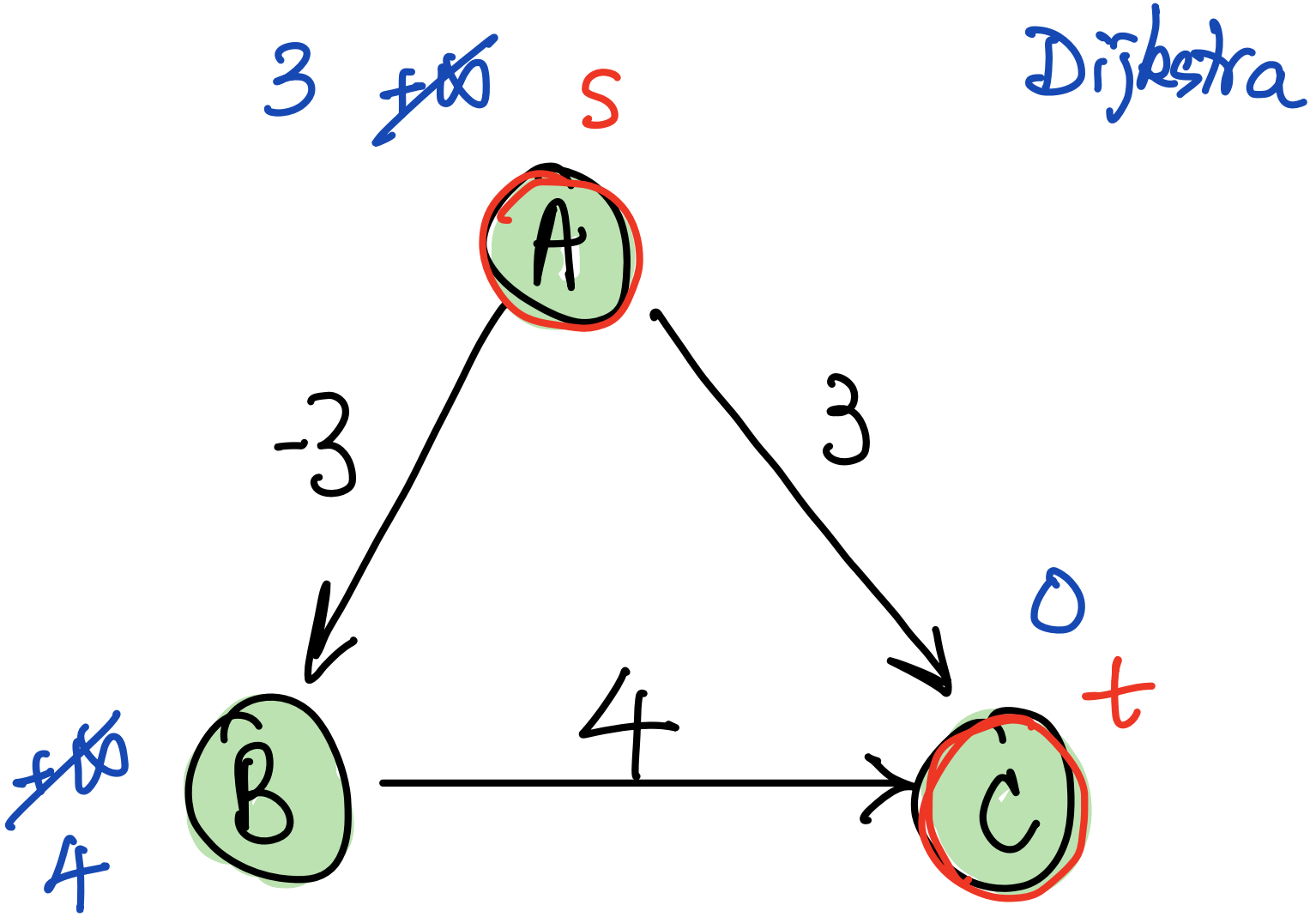


Fig. 1.9. A directed network with negative weight arcs

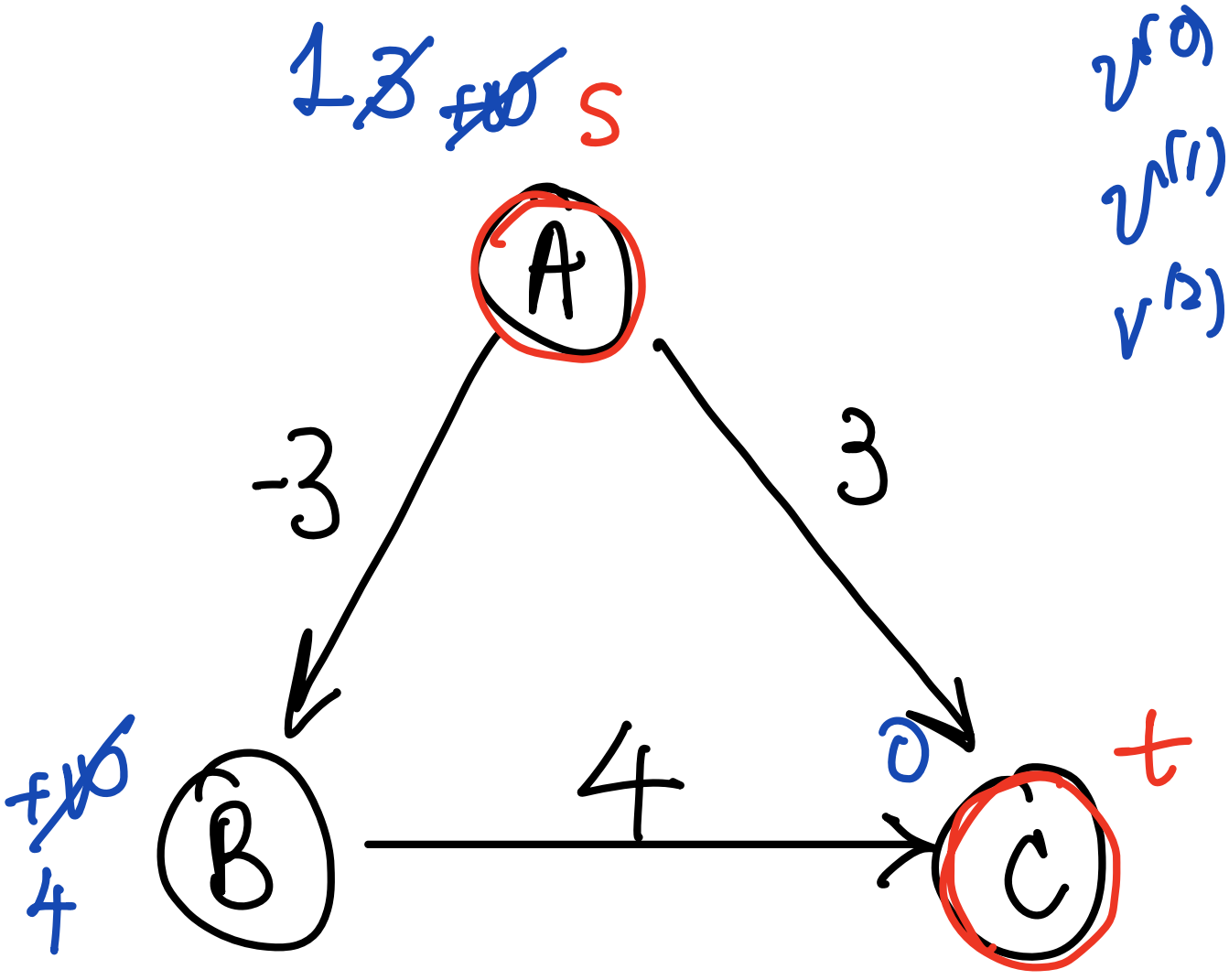
[Sierksma- Ghosh]

Find the Shortest Path



Find the Shortest Path

Bellman



$v^{(0)}$

$v^{(1)}$

$v^{(2)}$

$v_i^{(k+1)} = \min_j \{ c_{ij} + v_j^{(k)} \}$

Find the Minimum Spanning Tree

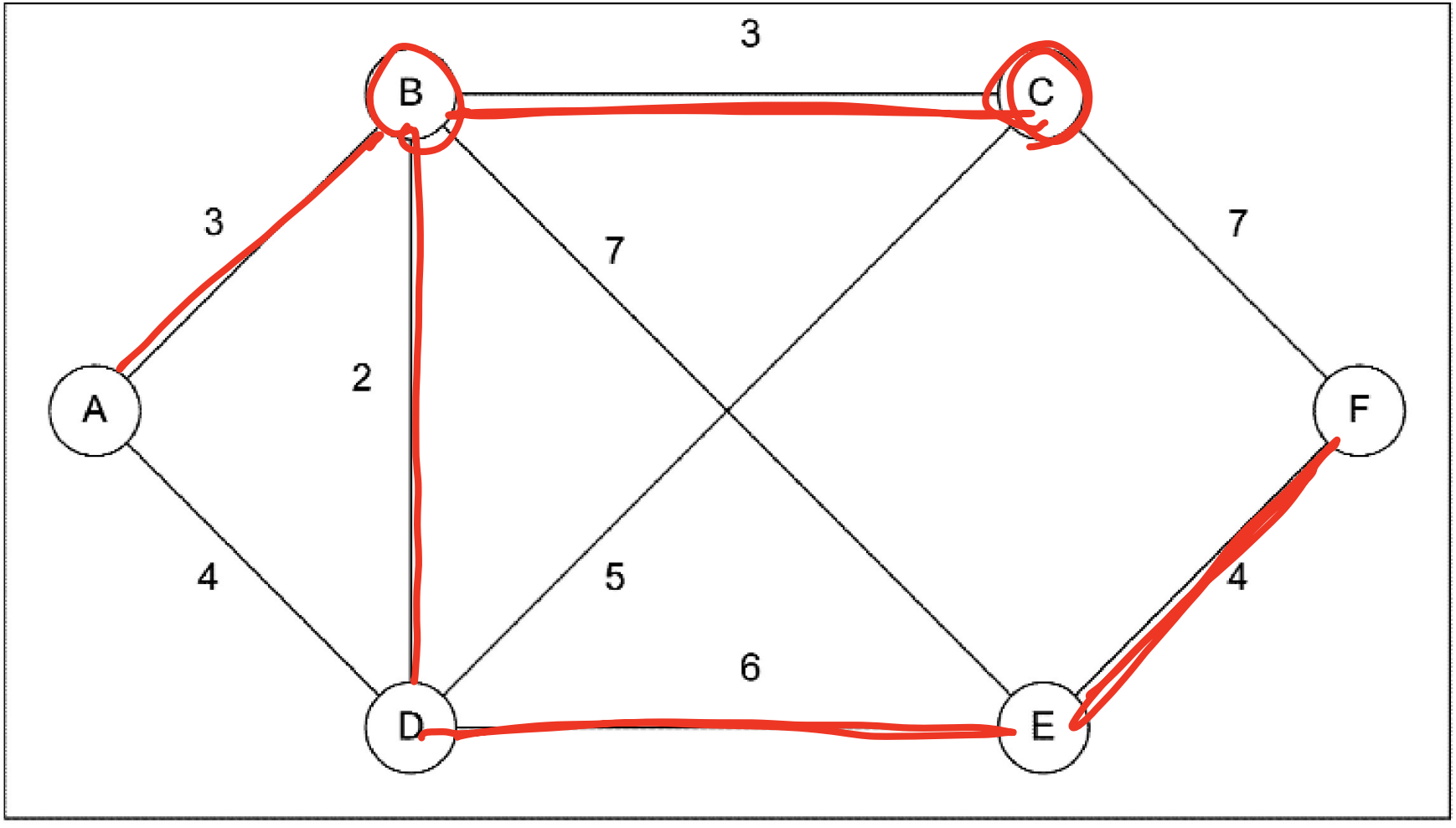


Fig. 2.1. Possible direct connections among the departments

3 2 3 6 4 18

[Sierksma–Ghosh]