

Assignment 2

1

- Net A: $\frac{1}{2}((1)^2 + (2)^2) + \frac{1}{2}((1)^2 + (3)^2) + \frac{1}{2}((1)^2 + (0)^2) = \frac{5}{2} + \frac{10}{2} + \frac{1}{2} = 8$
- Net B: $1 + 1 = 2$
- Net C: $2^2 + 3^2 = 13$
- Net D: $\frac{1}{2}(1) + \frac{1}{2}(10) + \frac{1}{2}(13) = 12$

So $8 + 2 + 13 + 12 = 35$

2

a)

$$C = \begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 10 \\ 0 & 0 & 10 & 0 \end{bmatrix}$$

$$\text{So } A = \begin{bmatrix} 3 & -1 & -1 & 0 \\ -1 & 3 & -1 & 0 \\ -1 & -1 & 12 & -10 \\ 0 & 0 & -10 & 30 \end{bmatrix}$$

b)

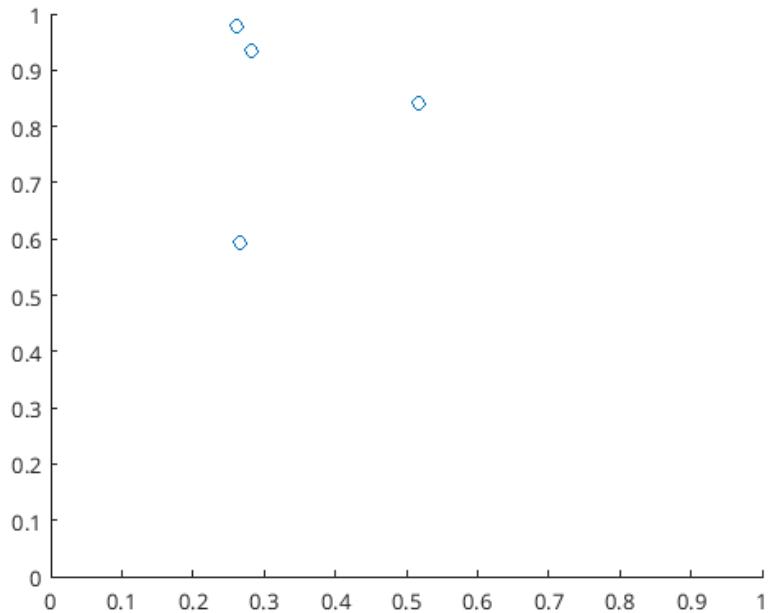
$$b_X = \begin{bmatrix} 1 \times 1 \\ 0 \times 1 \\ 0 \\ 20 \times 0.25 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 5 \end{bmatrix}$$

$$b_Y = \begin{bmatrix} 1 \times 1 \\ 0 \times 1 \\ 0 \\ 20 \times 1 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 20 \end{bmatrix}$$

c)

$$AX = b_x, AY = b_Y$$

Then we can get $X = \begin{bmatrix} \frac{95}{184} \\ \frac{49}{184} \\ \frac{13}{46} \\ \frac{6}{23} \end{bmatrix}$ $Y = \begin{bmatrix} \frac{155}{184} \\ \frac{109}{184} \\ \frac{43}{46} \\ \frac{45}{46} \end{bmatrix}$



d)

Left: 4,2 Right: 3,1

So gate 2 and gate 4 are assigned to the left. The pad at (0,0) and (0.25,1) will still be on the left part.

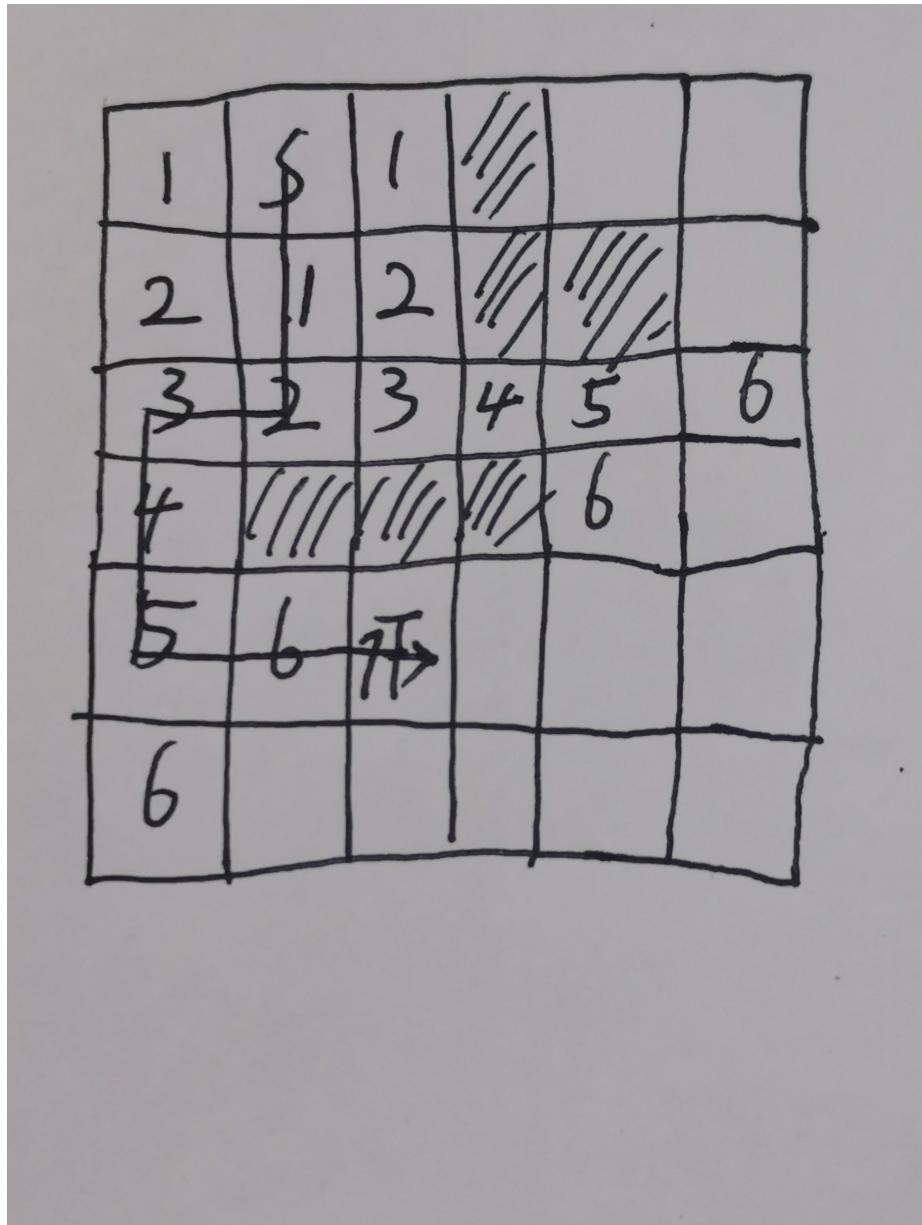
gate 1 and gate 3 will be propagated to the vertical cutline as pseudo-pads.

The pad at (1,1) will not be propagated to the vertical cutline as pseudo-pad because there is no connection between the pad and gate 2 or gate 4.

3

c) and d)

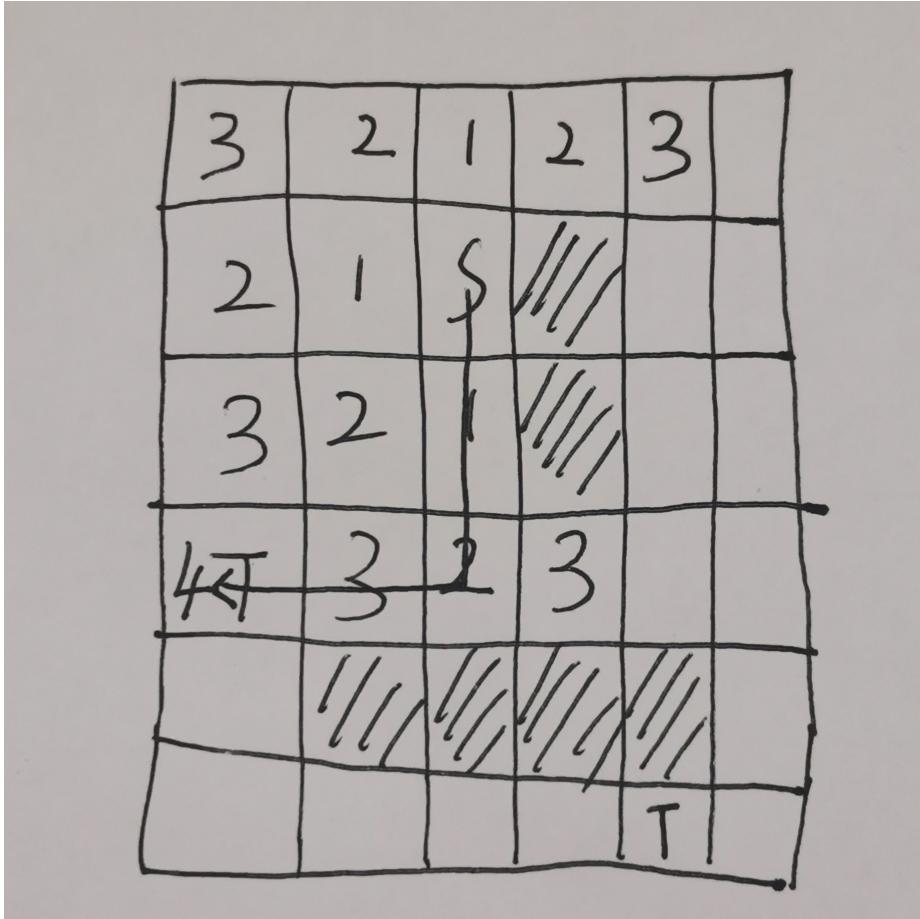
4



The pathcost is 7.

5

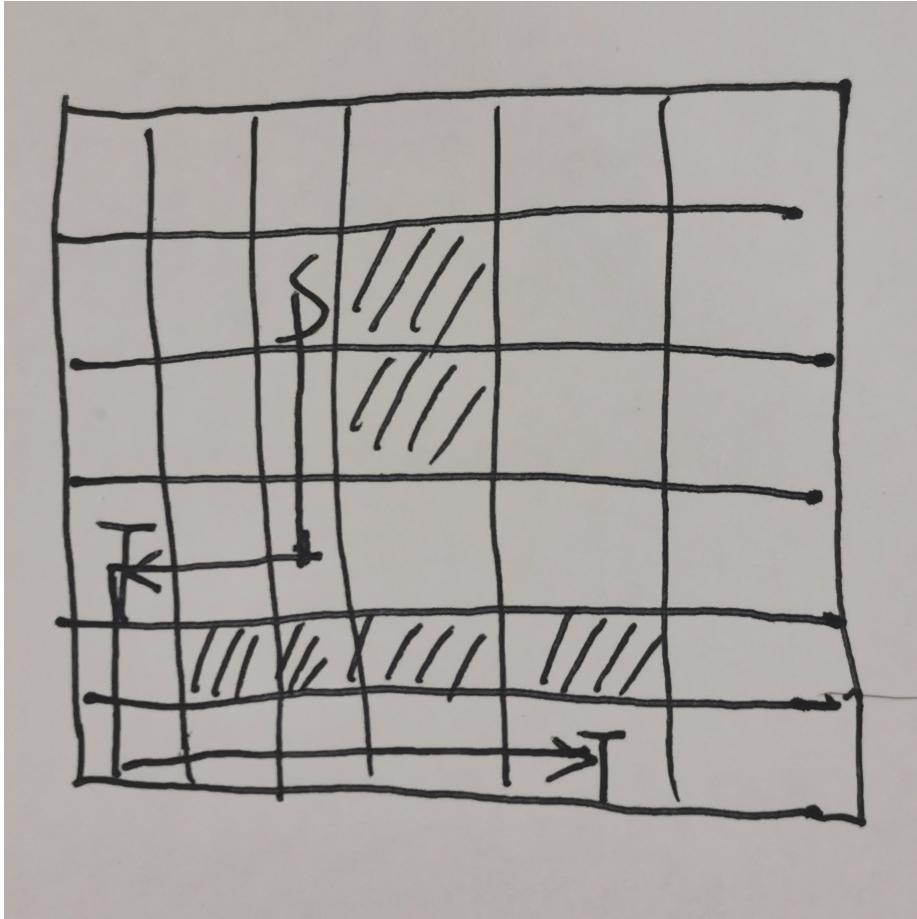
Find the first T.



Set the path as S and find another T.

3	2	1	2	3	4
2	1	5	///	4	5
1	1	5	///	3	4
5	5	5	1	2	3
1	///	///	///	///	4
2	3	4	5	6	5

The final path is:



The pathcost is 10.

6

$$15 \leq 3 + 2K$$

$$\text{So } K \geq 6.$$

If $K = 6$, the pathcost of using non-unit-cost cells and the pathcost of not using non-unit-cost cells is the same.

So it will not make sure that the final route will only use unit cost cells.

So the minimum value of K is 7 when the path through the unit-cost cells will be cheaper than the path through the non-unit-cost cells.

7

2	1	2	3	4	5
1	5	1	2	3	4
4	3	4	5	6	5
6	5	6	7		6
7	6	7			
	7				

The pathcost is 7.