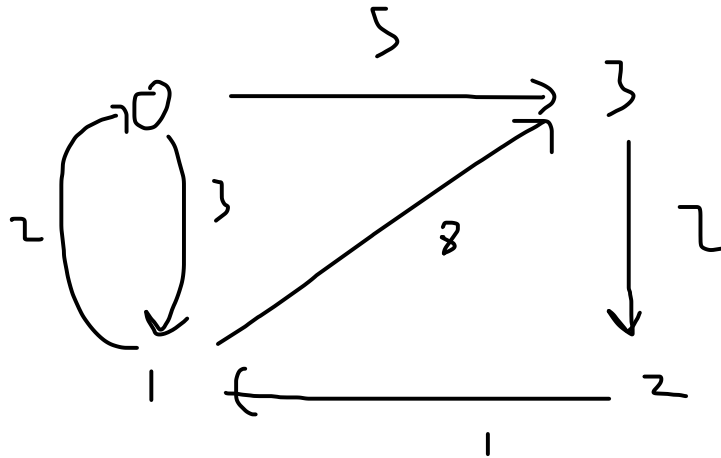


# Floyd Warshall



<u>u</u>	<u>v</u>	
0	1	2 - 0
0	2	2 - 1
0	3	2 - 3
1	0	3 - 0
1	2	3 - 1
1	3	3 - 2

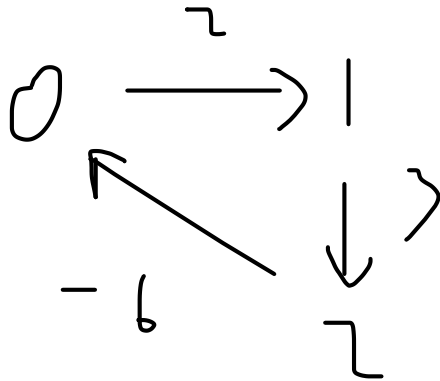
0 - 0 → 0

1 - 1 → 0

2 - 2 → 0

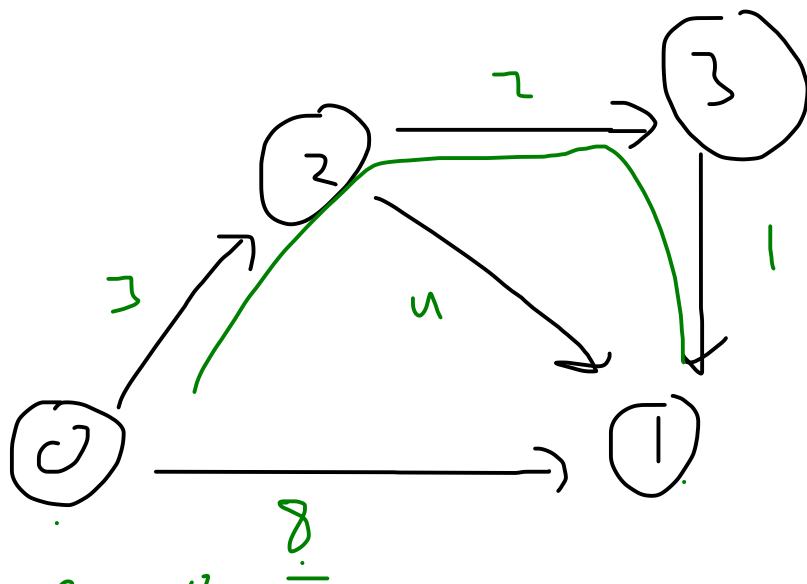
3 - 3 → 0

Detect -ve weight Cycle --> Floyd  
 Warshall will able to detect



$$0 - 0 = 0$$

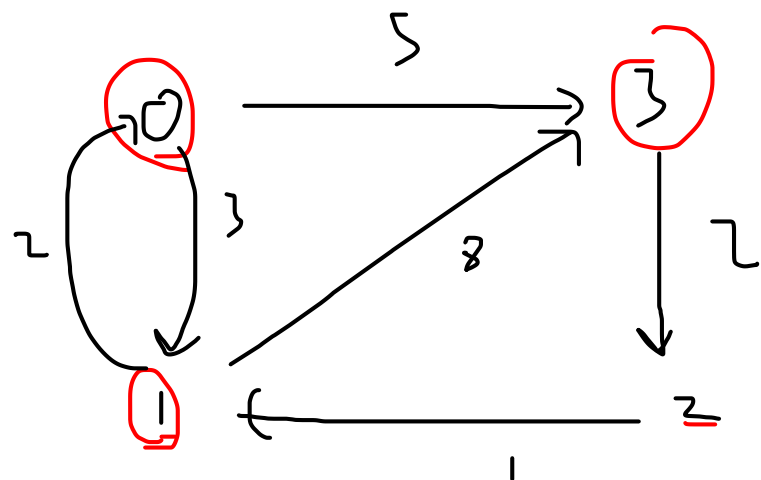
$$0 - 0 = -1$$



$$\begin{array}{lcl}
 0 & \begin{array}{c} \text{0} \quad \text{3} \quad \text{8} \\ \text{1} \quad \text{2} \end{array} & \\
 \hline
 d[0][1] = \underline{8} & \left| \right. & = \min(d[0][1], d[0][2] + d[2][1]) \\
 \text{vis } \underline{(2)} = 7 & & \\
 \text{vis } 3 = 6 & \left| \right. & = \min(d[0][1], d[0][2] + d[2][3])
 \end{array}$$

$$\boxed{d[i][j]} = \min (d[i][j], \underline{d[i][k]} + \underline{d[k][j]}) \text{ for node } \underline{k}$$





	0	1	2	3
0	0	3	8	5
1	2	0	8	8
2	8	1	0	9
3	8	8	2	0

~~0~~ =

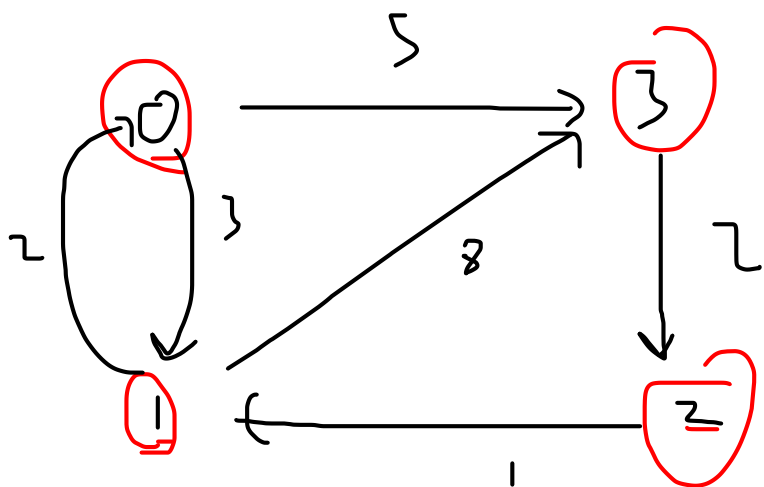
	0	1	2	3
0	<del>0</del>	<del>3</del>	<del>8</del>	<del>5</del>
1	2	0	<del>8</del>	<del>8</del>
2	8	1	0	9
3	<del>8</del>	8	2	0

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$$= \min(8, 2+5)$$

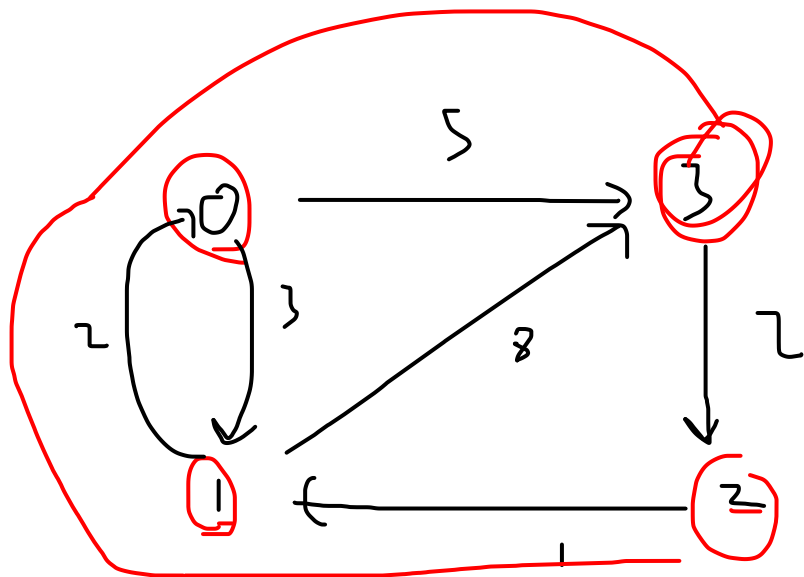
$8, 1=7$

$$dp[i] = \min(dp[i], dp[j] + w_{ij})$$



$$\underline{D_{\cancel{0}}} =$$

	0	1	2	3
0	<del>0</del>	<del>3</del>	<del>8</del>	<del>5</del>
<u>1</u>	2	0	<del>8</del>	<del>8</del>
2	<del>8</del>	<del>1</del>	0	9
3	<del>8</del>	8	2	0



	0	1	2	3	
0	0	3	8	5	
1	<del>2</del>	0	<del>8</del>	<del>8</del>	7
2	<del>8</del>	1	0	<del>9</del>	8
3	8	8	2	0	

$$D^1$$

$$8 + 7 = 8$$

$$D^2$$

$$D^3$$

$$D$$



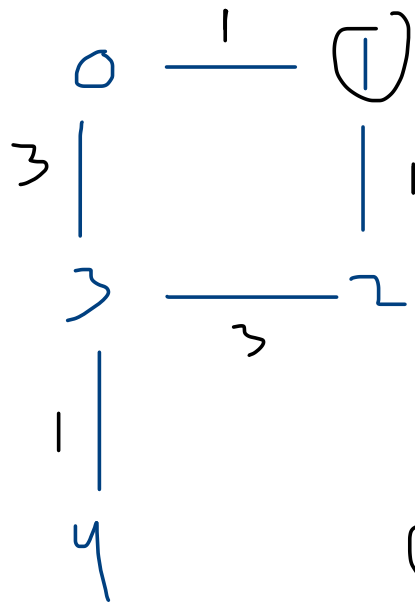
Find the City With the Smallest Number of Neighbors at a Threshold Distance



5	5	<u>3</u>
0	1	1
1	2	1
2	3	3
<u>3</u>	<u>4</u>	1
0	3	3

FW

$\leq Th$



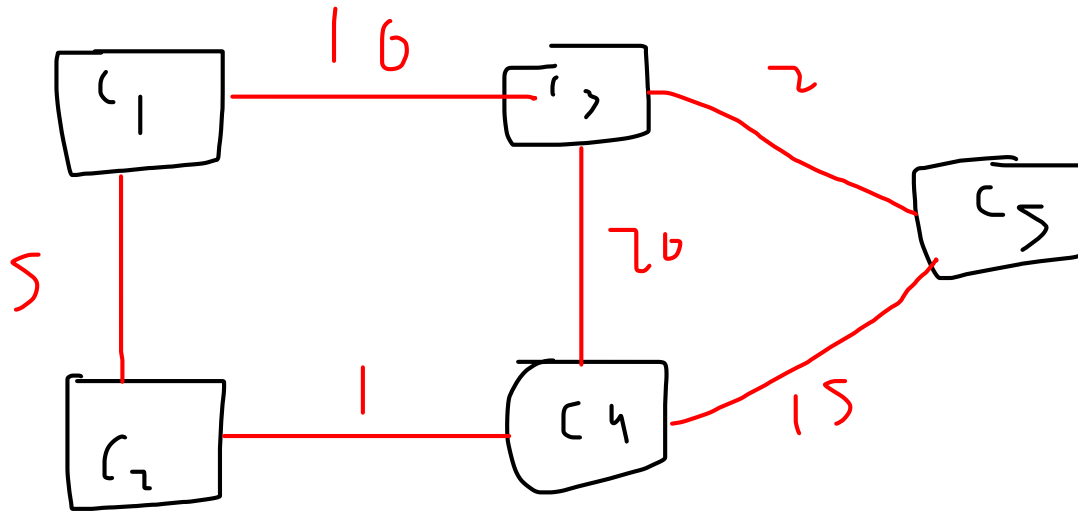
	0	1	2	3	4
0	0	1	$\infty$	3	$\infty$
1	1	0	1	$\infty$	$\infty$
2	$\infty$	1	0	3	$\infty$
3	3	$\infty$	3	0	1
4	$\infty$	$\infty$	$\infty$	1	0

$\checkmark$  City = 1, 2, 3, 4  
 $\checkmark$  City = 0, 2, 1  
 2 City = 1, 3  
 3 = 0, 2, 4  
 4 = 3

0	1	2	3	4
1	0	1	4	5
2	1	0	3	4
3	4	3	0	<u>1</u>
4	5	4	1	0

Expected Output

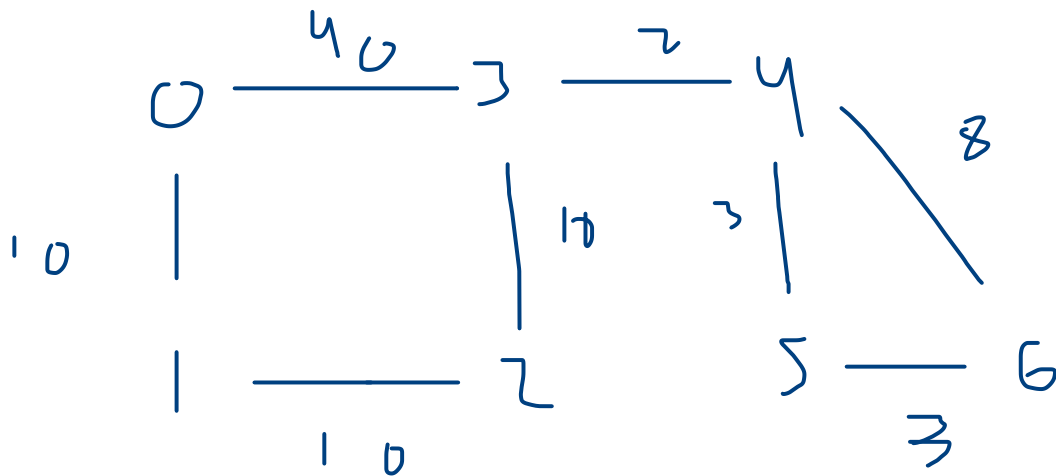
# Prim's Algorithm (Minimum Spanning Tree)



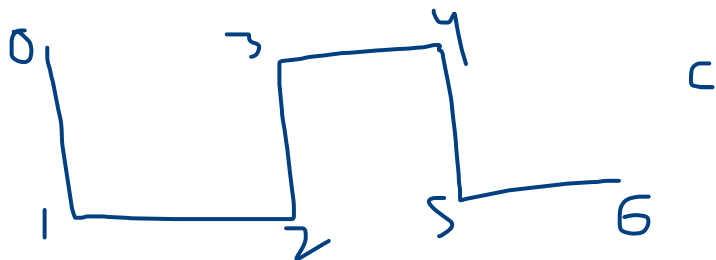
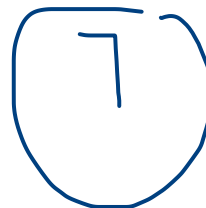
Lan  
Cables

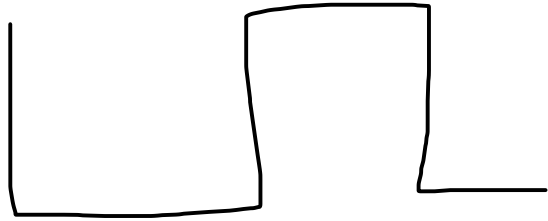
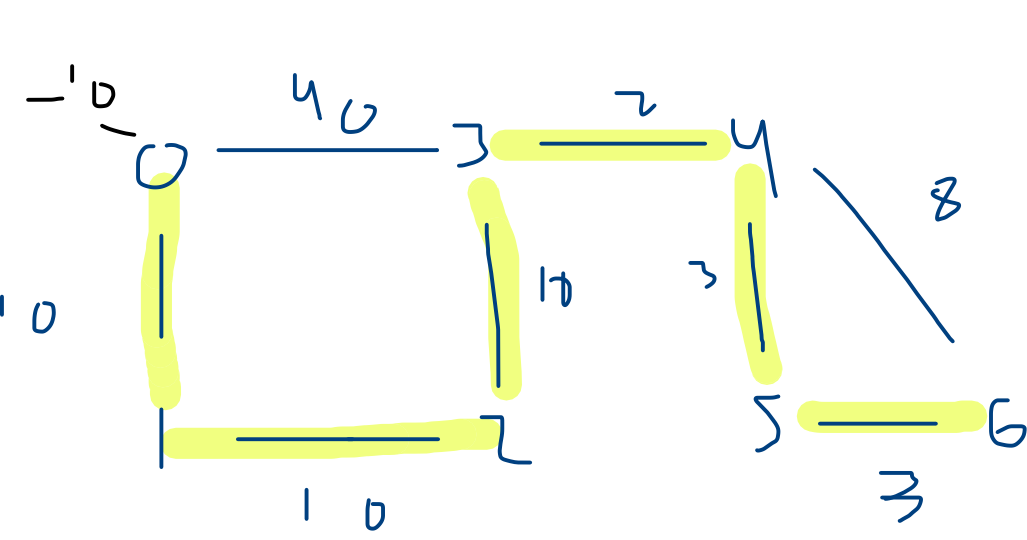
MST

1. Subgraph of Graph
2. Tree --> Connected and Acyclic
3. Spanning --> All Vtc are inter-connected with each other

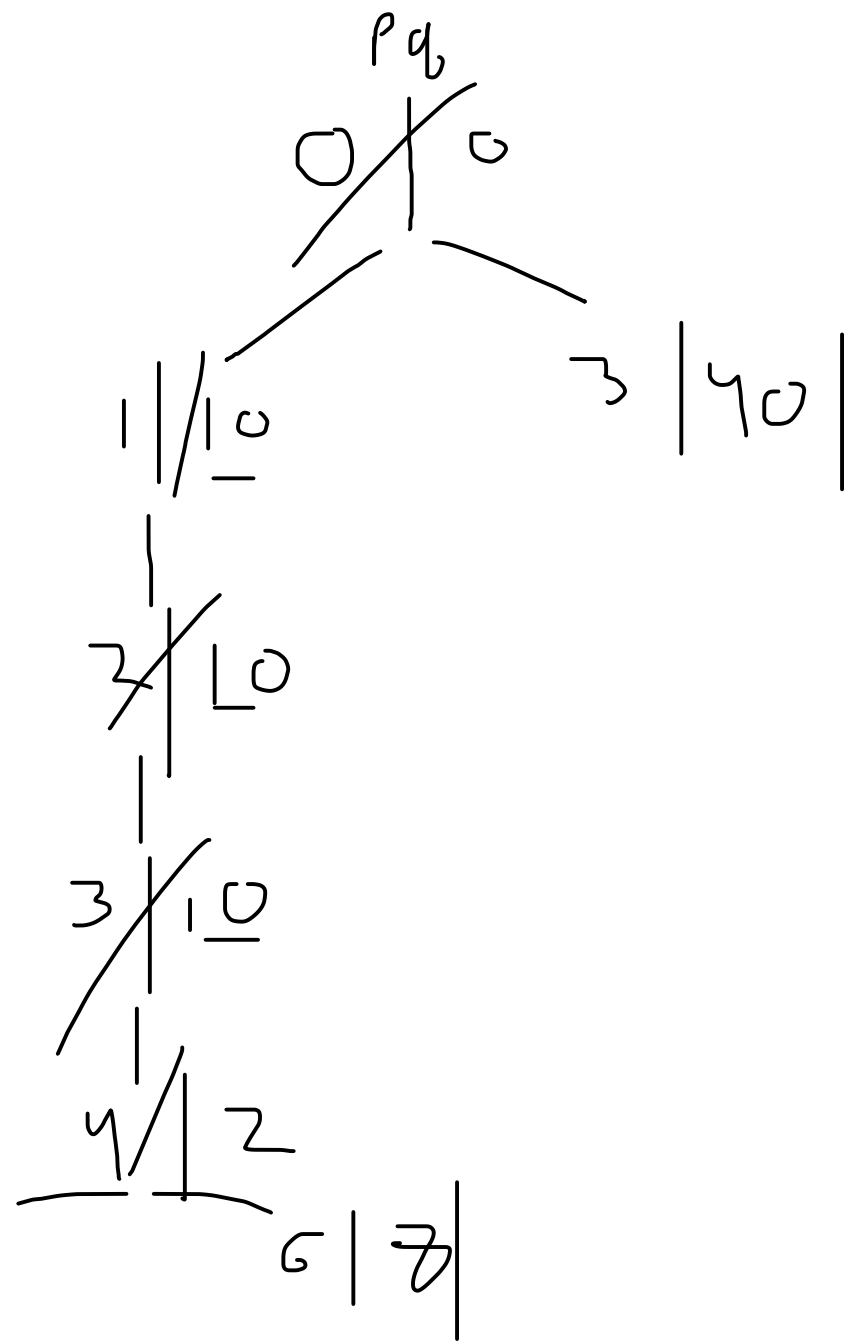


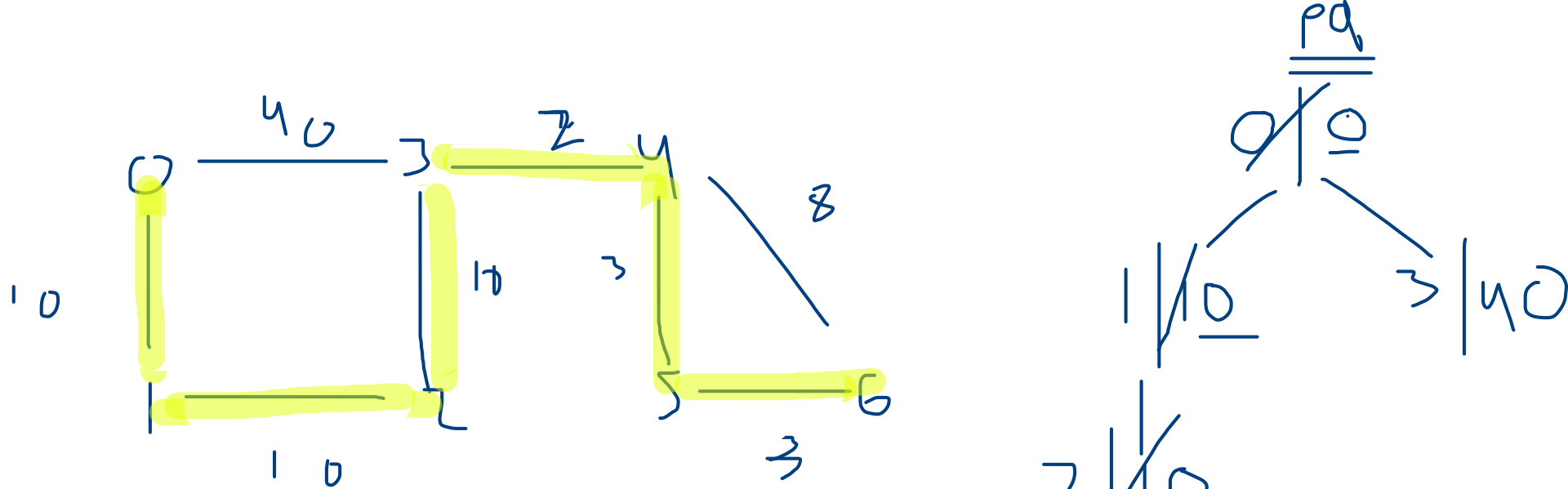
from



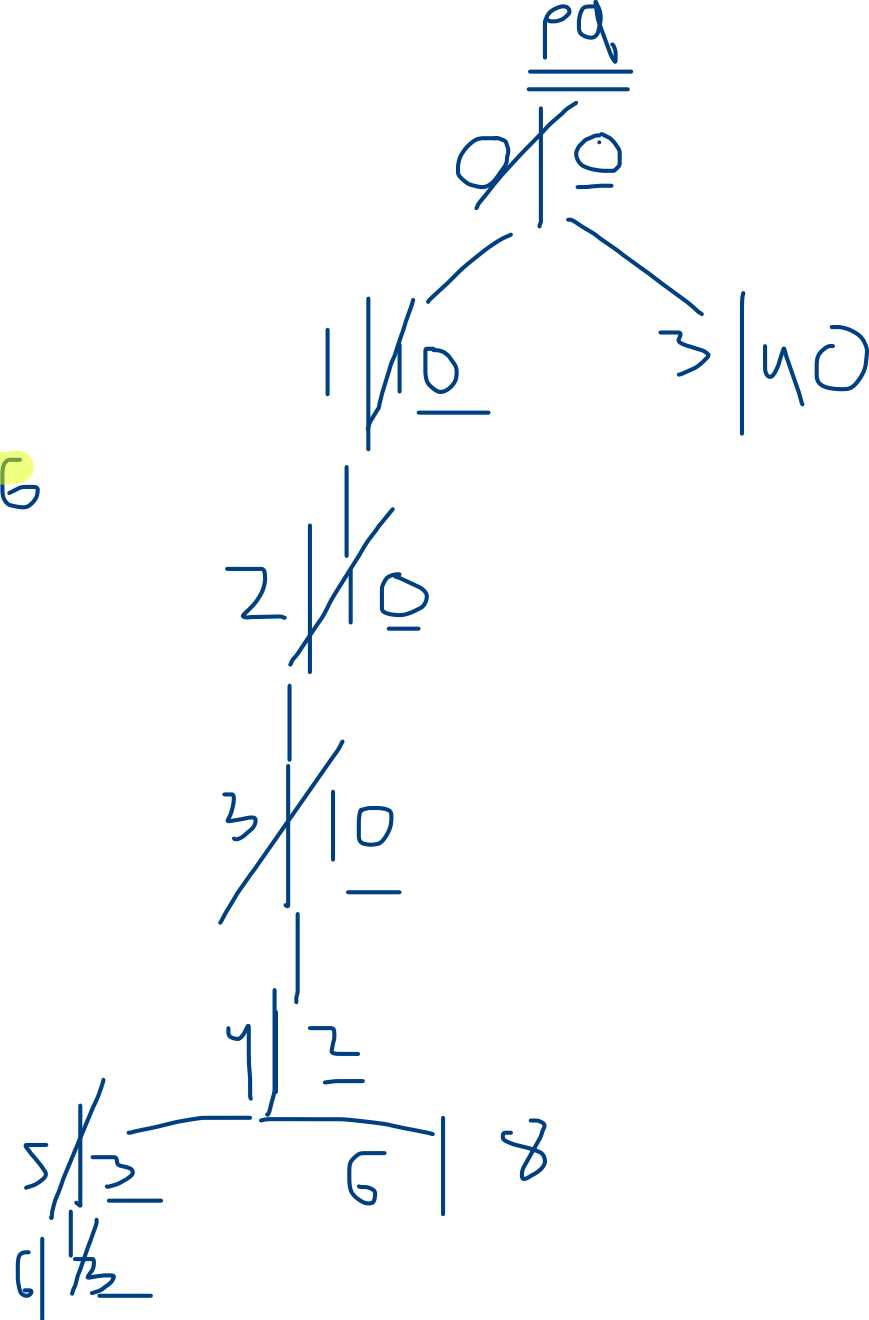


$$6/3 \sim 5/3$$

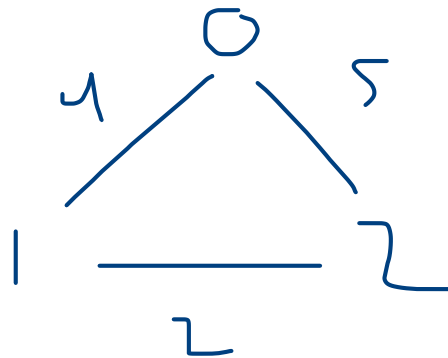




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Dijkstra and Prims can have diff paths



MST

