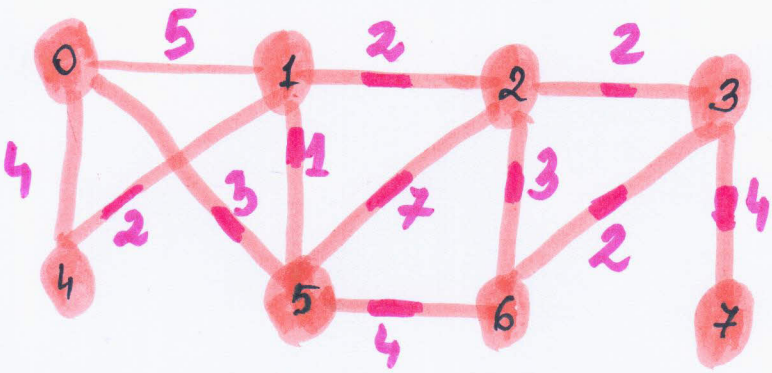
Manual execution minimum spanning tree using Prim's algorithm

Maisuc Ana-Doris
CR 915/1

8 vertices, 12 edges

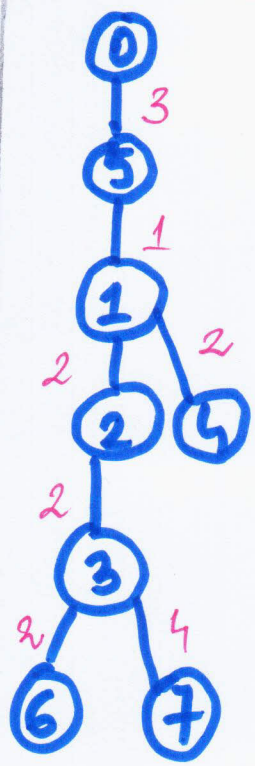


	Edge	Cost
1)	0 → 1	5
2)	0 → 4	4
3)	0 → 5	3
4)	1 → 2	2
5)	1 → 4	2
6)	1 → 5	1
7)	2 → 3	2
8)	2 → 5	7
9)	2 → 6	3
10)	3 → 6	2
11)	3 → 7	4
12)	5 → 6	4

MST = a subset of edges of a connected, edge-weighted undirected Graph, that connects all the vertices together, WITHOUT ANY CYCLES and with the min. possible weight.

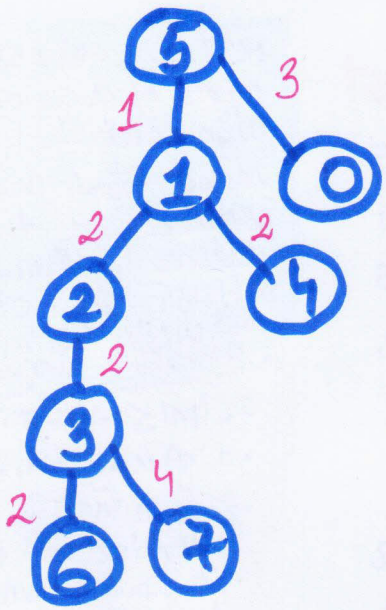
PRIM'S ALGORITHM
- a greedy alg. that finds a MST for a weighted und. graph.
- it finds a subset of the edges that forms a tree that includes every vertex, where the total weight in the tree is minim.

	selected edge	visited	edges	MST
initialization		0	{}	
iteration 1	(5, 0) - 3	0, 5	{(5,0)}	
iteration 2	(1, 5) - 1	0, 5, 1	{(5,0), (1,5)}	
iteration 3	(2, 1) - 2	0, 5, 1, 2	{(5,0), (1,5), (2,1)}	
iteration 4	(3, 2) - 2	0, 5, 1, 2, 3	{(5,0), (1,5), (2,1) (3,2)}	
iteration 5	(4, 1) - 2	0, 5, 1, 2, 3, 4	{(5,0), (1,5), (2,1) (3,2), (4,1)}	
iteration 6	(6, 3) - 2	0, 5, 1, 2, 3, 4, 6	{(5,0), (1,5), (2,1) (3,2), (4,1), (6,3)}	
iteration 7	(7, 3) - 4	0, 5, 1, 2, 3, 4, 6, 7	{(5,0), (1,5), (2,1) (3,2), (4,1), (6,3), (7,3)}	
iteration 8		all vertices visited		



Cost = 16

ANOTHER MST WITH THE SAME COST = 16



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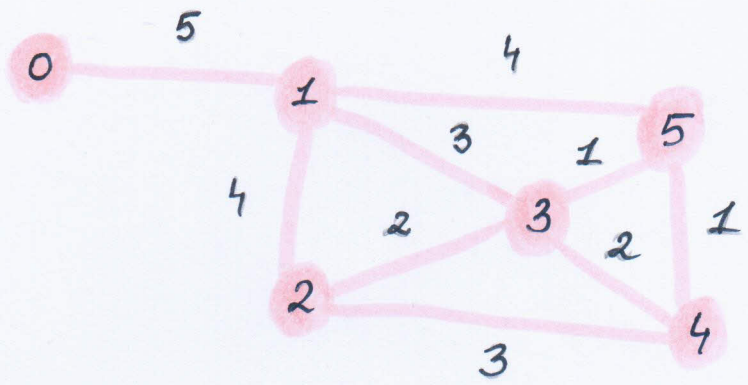
6 vertices 9 edges

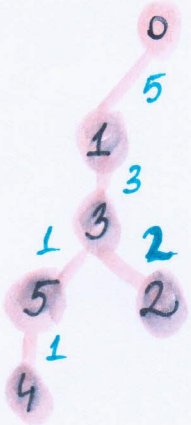
Minimum Spanning Tree using Prim's algorithm



Edges and costs

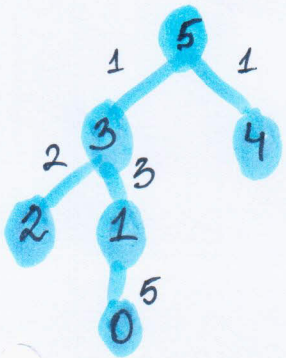
edge	cost
1) 0 → 1	5
2) 1 → 2	4
3) 1 → 3	3
4) 1 → 5	4
5) 2 → 3	2
6) 2 → 4	3
7) 3 → 4	2
8) 3 → 5	1
9) 4 → 5	1

MINIMUM SPANNING TREE ① starting vertex is 0.



TOTAL COST = 12(01 5 + 13 3 + 35 1 + 32 2 + 54 1)

MINIMUM SPANNING TREE ② starting vertex is 5.



TOTAL COST = 12(35 1 + 45 1 + 23 2 + 13 3 + 01 5)