Networks and Complexity

# Solution 1-6

*This is an example solution from the forthcoming book Networks and Complexity.*
*Find more exercises at https://github.com/NC-Book/NCB*

**Ex 1.6: Larger abstract example [2]**
Construct the minimal spanning tree in a network where the weight of links is given by

$$\mathbf{D} = \begin{pmatrix} 0 & 8 & 1 & 14 & 4 & 5 \\ 8 & 0 & 7 & 12 & 9 & 10 \\ 1 & 7 & 0 & 11 & 3 & 2 \\ 14 & 12 & 11 & 0 & 15 & 13 \\ 4 & 9 & 3 & 15 & 0 & 6 \\ 5 & 10 & 2 & 13 & 6 & 0 \end{pmatrix}.$$

To reduce the tediousness, the distances in this exercise have been chosen as 1,2,3, and so on. (Hint: If you draw unknown networks like this one it is best to arrange nodes in a circle.)

*Solution*
Using Kruskal's algorithm we do the following:

1. Try (1,3) [1] – accept
2. Try (3,6) [2] – accept
3. Try (3,5) [3] – accept
4. Try (1,5) [4] – reject
5. Try (1,6) [5] – reject
6. Try (5,6) [6] – reject
7. Try (2,3) [7] – accept
8. Try (1,2) [8] – reject
9. Try (2,5) [9] – reject
10. Try (2,6) [10] – reject
11. Try (3,4) [11] – accept

Hence, the edge set of the solution is

$$E = \{(1,3),(3,6),(3,5),(2,3),(3,4)\}. \tag{1}$$