Ads Homework 11
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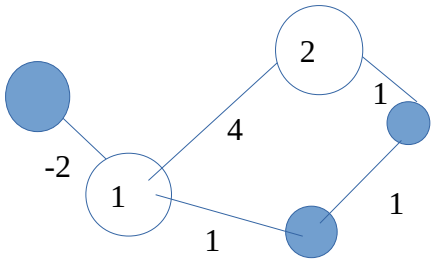
Problem 11.1

The algorithm is not correct and we can prove that by a simple counter example. Imagine the following graph:
In the graph below the shortest path between nodes 1 and 2 is of size 3 and is the path on the right. If we increase all numbers by 2 or 3 such that we get rid of the -2 then in both cases the path in the right becomes longer then the direct path connecting the 2 nodes as it contains 3 edges and thus the numer is added 3 times. So in this case the algorithm that our friend proposed would say the shortest path is the direct path 4 when in fact it is the right path 3;



Problem 11.3

a) To understand the graph I will explain what is represented by nodes and edges. \
For example taking a board of size 3x3, I mark the entries of the 3x3 table as 0, 1 ,… up to 8 and these will be the nodes of our graph (so 0 is the node representing (0,0) of the board, 3 represents (1,0) and so on) and we will have a directed edge connecting one of the nodes to the other when it is possible under the constraints of the problem to move from one node to the other in the table. For example having the table
1(0) 2(1) 3(2)
2(3) 2(4) 2(5)
1(6) 1(7) 4(8) in brackets I have written the node that represents each entry.

Take node 7 for example. Under the constraints of the problem if we are at that position we can move up, left or right so in the graph node 7 will be connected to 8, 4, and 6 with a directed edge(as we can move from 7 to 4 but we do not know if we can move from 4 to 7).
Then I use dijkstra's algorithm to find the shortest path from the first to the last entry if there is one.