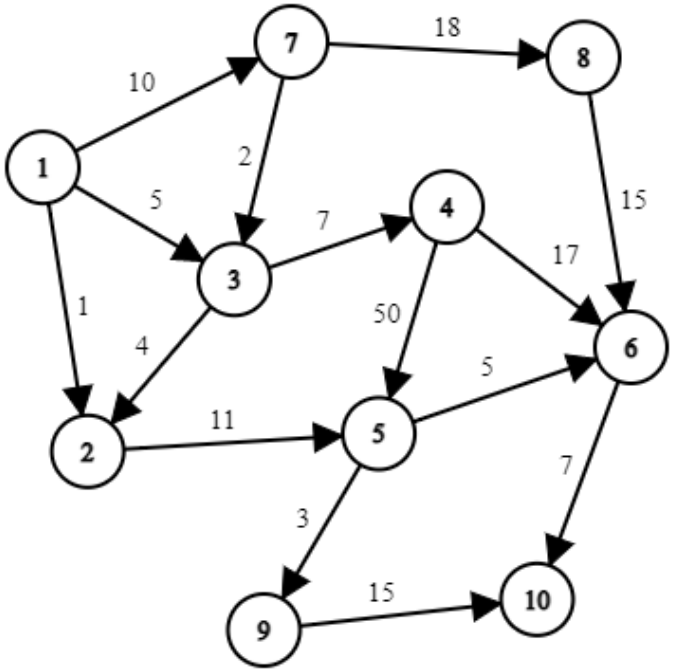
Laboratory 2 – Zsok Alina-Valentina

Problem: 2. Write a program that, given a directed graph and two vertices, finds a lowest length path between them, by using a backward breadth-first search from the ending vertex.

Dout – Dictionary Value	
Key	Value(s)
1	[2, 3, 7]
2	[5]
3	[2, 4]
4	[5, 6]
5	[6, 9]
6	[10]
7	[3, 8]
8	[6]
9	[10]
10	[]



Lowest length path between **s** and **t** using backward breadth-first search starting from **s**.

- ***s** = 1 and **t** = 10*

s = 1 and t = 10	current Node	queue	already Checked (visited)	paths
Iteration 1	10	6, 9	empty	[10,6] [10,9]
Iteration 2	6	9, 4, 5, 8	10	[10, 9] [10, 6, 4] [10, 6, 5] [10, 6, 8]
Iteration 3	9	4, 5, 8	10, 6	[10, 6, 4] [10, 6, 5] [10, 6, 8] [10, 9, 5]
Iteration 4	4	5, 8, 3	10, 6, 9	[10, 6, 5] [10, 6, 8] [10, 9, 5] [10, 6, 4, 3]
Iteration 5	5	8, 3, 2	10, 6, 9, 4	[10, 6, 8] [10, 6, 4, 3] [10, 6, 5, 2] [10, 9, 5, 2]

Iteration 6	8	3, 2, 7	10, 6, 9, 4, 5	[10, 6, 4, 3] [10, 6, 5, 2] [10, 9, 5, 2] [10, 6, 8, 7]
Iteration 7	3	2, 7, 1	10, 6, 9, 4, 5, 8	[10, 6, 5, 2] [10, 9, 5, 2] [10, 6, 8, 7] [10, 6, 4, 3, 1] [10, 6, 4, 3, 7]
Iteration 8	2	7, 1	10, 6, 9, 4, 5, 8, 3	[10, 6, 8, 7] [10, 6, 4, 3, 1] [10, 6, 4, 3, 7] [10, 6, 5, 2, 1] [10, 9, 5, 2, 1]
Iteration 9	7	1	10, 6, 9, 4, 5, 8, 3, 2	[10, 6, 4, 3, 1] [10, 6, 5, 2, 1] [10, 9, 5, 2, 1] [10, 6, 8, 7, 1] [10, 6, 4, 3, 7, 1]
Iteration 10	1	empty	10, 6, 9, 4, 5, 8, 3, 2, 7	[10, 6, 4, 3, 1] [10, 6, 5, 2, 1] [10, 9, 5, 2, 1] [10, 6, 8, 7, 1] [10, 6, 4, 3, 7, 1]
Iteration 11	none	empty	10, 6, 9, 4, 5, 8, 3, 2, 7, 1	[10, 6, 5, 2, 1] – is chosen

- ***s** = 9 and **t** = 1*

  it checks if exists entries for s (9) in Dout (Dictionary out) and for t (1) in Din (Dictionary in).

- ***s** = 9 and **t** = 4*

s = 9 and t = 4	current Node	queue	already Checked (visited)	paths
Iteration 1	4	3	empty	[4, 3]
Iteration 2	3	1, 7	4	[4, 3, 1] [4, 3, 7]
Iteration 3	1	7	4, 3	[4, 3, 1] [4, 3, 7]
Iteration 4	7	empty	4, 3, 1	[4, 3, 1] [4, 3, 7]
Iteration 5	none	empty	4, 3, 1, 7	nothing – unreachable

	Minimum Length Paths			
	1 → 100		100 → 1	
	Path	Length	Path	Length
graph1k.txt	[100, 647, 220, 665, 229, 937, 783, 581, 1]	272	No path found	
graph10k.txt	No path found		No path found	
graph100k.txt				

Graph made with → https://csacademy.com/app/graph_editor/