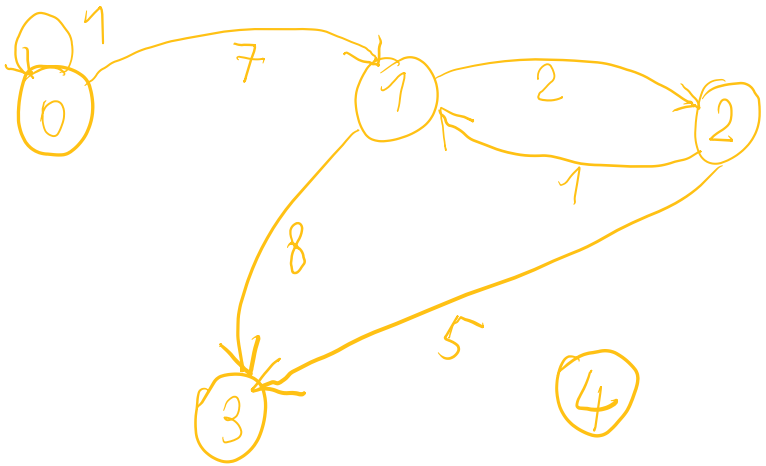
Lab 3: “Backwards” Dijkstra

Graph with 5 vertices and 6 edges:

5 6
0 0 1
0 1 7
1 2 2
2 1 1
1 3 8
2 3 5



Example 1

start: 0

end: 3

Step	queue	previous	distances	visited	current	next	cost	distance
		0 1 2 3 4	0 1 2 3 4					
init	[3:0]	- - - - -	∞ ∞ ∞ 0 ∞	{3}	-	-	-	-
1	[]	^	^	^	3	-	-	-
1.1	[1:8]	- 3 - - -	∞ 8 ∞ 0 ∞	{1, 3}	^	1	8	8
1.2	[1:8, 2:5]	- 3 3 - -	∞ 8 5 0 ∞	{1, 2, 3}	^	2	5	5
2	[1:8]	^	^	^	2	-	-	-
2.1	^	1 2 3 - -	15 7 5 0 ∞	^	^	1	2	7
3	[]	^	^	^	1	-	-	-
3.1	[0:14]	1 2 3 - -	14 7 5 0 ∞	{0, 1, 2, 3}	^	0	7	14
4	[]	^	^	^	0	-	-	-

^ = unchanged

After step 4 the path is created following the vertices in *previous* as follows: 0 -> 1 -> 2 -> 3

Example 2

start: 0

end: 4

Step	queue	previous	distances	visited	current	next	cost	distance
init	[4:0]	0 1 2 3 4 - - - - -	0 1 2 3 4 ∞ ∞ ∞ ∞ 0	{4}	-	-	-	-
1	[]	^	^	^	4	-	-	-

Because vertex 4 doesn't have any inbound edges and there's no vertices left in the queue the algorithm stops and the result is an empty path which means the path is not possible.

Example 3

start: 4

end: 1

Step	queue	previous	distances	visited	current	next	cost	distance
init	[1:0]	0 1 2 3 4 - - - - -	0 1 2 3 4 ∞ 0 ∞ ∞ ∞	{1}	-	-	-	-
1	[]	^	^	^	1	-	-	-
1.1	[0:7]	0 1 2 3 4 1 - - - -	0 1 2 3 4 7 0 ∞ ∞ ∞	{0, 1}	^	0	7	7
1.2	[0:7, 2:1]	0 1 2 3 4 1 - 1 - -	0 1 2 3 4 7 0 1 ∞ ∞	{0, 1, 2}	^	2	1	1
2	[0:7]	^	^	^	2	-	-	-
2.1	^	^	^	^	^	1	2	3
3	[]	^	^	^	0	-	-	-
3.1	^	^	^	^		0	1	8

Because there's no vertices left in the queue and the start vertex hasn't been reached the algorithm returns an empty path which means the path is not possible.