Zadání 1. úkolu do předmětu IZU

Jméno: Kuchař Josef Login: xkucha28

Pomocí metody A^* najděte nejkratší cestu v mapě složené z pravidelných buněk, kde cena přechodu mezi dvěma stavy (buňkami) je dána číslem, uvedeným v Tabulce 1 (a je stejná pro všechny přechody ze sousedních míst do příslušné buňky). Nepřekročitelné buňky mají hodnotu "Z" (jako "zeď"). Po každém kroku vypište nové hodnoty seznamů Open a Closed. Do pomocné tabulky s ohodnocením uzlů zapisujte aktuálně zkoumaný uzel, cenu cesty do aktuálního uzlu "g", heuristiku "h" a celkovou cenu cesty "f". Heuristiku počítejte jako přímou vzdálenost středů dvou buněk, kde velikost strany jedné buňky je rovna jedné. Uzly generujte v pořadí zleva doprava a shora dolů, uvažujte 8-okolí buňky (tzn. operátory \nwarrow , \uparrow , \nearrow , \leftarrow , \rightarrow , \checkmark , \downarrow , \searrow). Výslednou cestu zapište do tabulky Výsledná cesta. Uzel se skládá ze souřadnic, z ohodnocení f a souřadnic uzlu, ze kterého byl vygenerován nebo z operátoru, který byl použit (aby bylo možné nalézt cestu od startu k cíli).

Uzly zapisujte: ([sloupec, řádek], celkové ohodnocení f, [souřadnice otcovského uzlu nebo operátor])

Start: ([2, 4], 5.0, [null]) Cíl: ([6, 7], X, [?, ?])

Výsledná cesta:

[2, 4]	[3, 5]	[4, 6]	[5, 5]	[6, 6]
[6, 7]				

y/x	0	1	2	3	4	5	6	7	8	9
0	8	8	8	8	Z	9	7	7	8	9
1	8	8	6	7	Z	9	9	9	9	9
2	9	9	9	9	\mathbf{Z}	9	9	9	9	9
3	9	\mathbf{Z}	Z	\mathbf{Z}	Z	\mathbf{Z}	\mathbf{Z}	\mathbf{Z}	9	7
4	9	\mathbf{Z}	2	6	\mathbf{Z}	8	9	9	9	6
5	9	\mathbf{Z}	5	4	Z	3	3	3	3	3
6	3	3	3	3	3	9	4	7	9	7
7	9	9	8	8	Z	9	2	8	8	9
8	6	6	5	7	Z	Z	Z	Z	7	8
9	7	7	7	5	Z	8	7	8	7	9

Tabulka 1: Mapa přechodů. Např. cena přechodu do cílové buňky je rovna 2 pro všechny buňky s cílovou buňkou sousedící.

Pomocná tabulka:

	Uzel	g	h	f		Uzel	g	h	f
01.	[2, 4]	0	5.0	5.0	16.	[6, 4]	19	3	22
02.	[3, 4]	6	4.24	10.24	17.	[6, 5]	13	2	15
03.	[2, 5]	5	4.47	9.47	18.	[6, 6]	14	1	15
	[3, 5]	4	3.61	7.61	19.	[0, 5]	17	6.32	23.32
	[2, 6]	7	4.12	11.12	20.	[0, 6]	11	6.08	17.08
06.	[3, 6]	7	3.16	10.16	21.	[0, 7]	17	6	23
07.	[4, 6]	7	2.24	9.24	22.	[7, 5]	16	2.24	18.24
08.	[5, 5]	10	2.24	12.24	23.	[7, 6]	20	1.41	21.41
09.	[5, 6]	16	1.41	17.41	24.	[6, 7]	16	0	16
10.	[3, 7]	15	3	18	25.	[7, 7]	22	1	23
11.	[5, 7]	16	1	17	26.	[7, 4]	22	3.16	25.16
12.	[1, 6]	8	5.1	13.1	27.	[7, 5]	16	2.24	18.24
13.	[2, 7]	15	4	19	28.	[7, 6]	20	1.41	21.41
14.	[1, 7]	16	5	21	29.				
	[5, 4]	18	3.16	21.16	30.				

${\bf 1.\ iterace}$

Open:
[2, 4], 5.0, NULL

Closed:

2. iterace

Open:
[3, 4], 10.24, [2, 4] [2, 5], 9.47, [2, 4] [3, 5], 7.61, [2, 4]

Closed:		
Closed: [2, 4], 5.00, NULL		

3. iterace							
Open:							
[3, 4], 10.24, [2, 4]	[2, 5],	9.47, [2, 4]	[2, 6]	, 11.12, [3, 5]	[3, 6], 10.16, [3, 5]	[4, 6], 9.24, [3, 5]	
					•		
Closed: [2, 4], 5.00, NULL	[3 5]	7 61 [2 4]					
[2, 4], 0.00, NOLL	[0, 0],	7.01, [2, 4]					
1. iterace							
ı. iterace							
Open:							
[3, 4], 10.24, [2, 4]	[2, 5],	9.47, [2, 4]	[2, 6]	, 11.12, [3, 5]	[3, 6], 10.16, [3, 5]	[5, 5], 12.24, [4, 6]	
[5, 6], 17.41, [4, 6]	[3, 7],	18.00, [4, 6]	[5, 7]	, 17.00, [4, 6]			
					1		
Closed:	[0 []	7.04 [0.4]	F4 01	0.04 [0.5]	T		
[2, 4], 5.00, NULL	[3, 5],	7.61, [2, 4]	[4, 6]	, 9.24, [3, 5]			
	<u> </u>				1		
5. iterace							
Open:							
[3, 4], 10.24, [2, 4]	[2, 6],	11.12, [3, 5]	[3, 6]	, 10.16, [3, 5]	[5, 5], 12.24, [4, 6]	[5, 6], 17.41, [4, 6]	
[3, 7], 18.00, [4, 6]							
[,],, [· , •]	E-7 - 17	, [- , •]	L , ~]	,, <u>-</u> , -			
			 				
	<u> </u>						
Closed:							
[2, 4], 5.00, NULL	[3, 5],	7.61, [2, 4]	[4, 6]	, 9.24, [3, 5]	[2, 5], 9.47, [2, 4]		
			i 				

6. iterace

[3, 4], 10.24, [2, 4] [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] 7. iterace Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] S. iterace Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [2, 6], 11.12, [3, 5] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [2, 6], 11.12, [3, 5]	Open:				
Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] (iterace Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [6, 6], 17.41, [4, 6] [7, 1], 18.00, [4, 6] [8, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [5, 5], 12.24, [4, 6] [5, 5], 12.24, [4, 6] [6, 6], 17.41, [4, 6] [7, 7], 18.00, [4, 6] [8, 7], 18.00, [4, 6] [9, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					[3, 7], 18.00, [4, 6]
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6], 10.16, [3, 5]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2,	5] [2, 7], 19.00, [3, 6]		
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6], 10.16, [3, 5]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6], 10.16, [3, 5]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6], 10.16, [3, 5]					
Closed: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [4, 6], 9.24, [3, 5] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] [2, 7], 19.00, [3, 6], 10.16, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	Closed:	[2 5] 761 [2 4	11 [4 6] 0 24 [3 5]	[2 5] 0 47 [2 4]	[2 6] 10 16 [2 5]
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	[2, 4], 3.00, NOLL	[3, 3], 7.01, [2, 4	[4, 0], 9.24, [3, 3]	[2, 3], 9.47, [2, 4]	[3, 0], 10.10, [3, 3]
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
Open: [2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	7 • 4				
[2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	. nerace				
[2, 6], 11.12, [3, 5] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4] [3, 4], 10.24, [2, 4] [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]		[5, 5], 12.24, [4,	6] [5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4]	[1, 6], 13.10, [2, 5]	[2, 7], 19.00, [3,	6]		
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5] [3, 4], 10.24, [2, 4]					
[3, 4], 10.24, [2, 4] S. iterace Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	Closed:	10 51 7.04 10 4	11 [4 0] 0 04 [0 5]	10 51 0 47 10 41	10 01 40 40 10 51
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6] Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]			[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]	[3, 4], 10.24, [2, 4]				
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]					
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]					
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]					
Open: [5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]					
[5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]	3. iterace				
[5, 5], 12.24, [4, 6] [5, 6], 17.41, [4, 6] [3, 7], 18.00, [4, 6] [5, 7], 17.00, [4, 6] [1, 6], 13.10, [2, 5] [2, 7], 19.00, [3, 6] [1, 7], 21.00, [2, 6]	Open:				
Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]		[5, 6], 17.41, [4,	6] [3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]
Closed: [2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2,	6]		
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
[2, 4], 5.00, NULL [3, 5], 7.61, [2, 4] [4, 6], 9.24, [3, 5] [2, 5], 9.47, [2, 4] [3, 6], 10.16, [3, 5]					
[3, 4], 10.24, [2, 4] [2, 6], 11.12, [3, 5]				[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
	[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3,	5]		

9. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[1, 6], 13.10, [2, 5]	[2, 7], 19.00, [3, 6]
[1, 7], 21.00, [2, 6]	[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[6, 6], 15.00, [5, 5]
Closed:				
[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]		

10. iterace

Open:

Open.				
[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]
[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[6, 6], 15.00, [5, 5]	[0, 5], 23.32, [1, 6]
[0, 6], 17.08, [1, 6]	[0, 7], 23.00, [1, 6]			

Closed:

Closed.				
[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[1, 6], 13.10, [2, 5]	

11. iterace

Open:

Орси.				
[5, 6], 17.41, [4, 6]	[3, 7], 18.00, [4, 6]	[5, 7], 17.00, [4, 6]	[2, 7], 19.00, [3, 6]	[1, 7], 21.00, [2, 6]
[5, 4], 21.16, [5, 5]	[6, 4], 22.00, [5, 5]	[6, 5], 15.00, [5, 5]	[0, 5], 23.32, [1, 6]	[0, 6], 17.08, [1, 6]
[0, 7], 23.00, [1, 6]	[7, 5], 19.24, [6, 6]	[7, 6], 22.41, [6, 6]	[6, 7], 16.00, [6, 6]	[7, 7], 23.00, [6, 6]

Closed:

[2, 4], 5.00, NULL	[3, 5], 7.61, [2, 4]	[4, 6], 9.24, [3, 5]	[2, 5], 9.47, [2, 4]	[3, 6], 10.16, [3, 5]
[3, 4], 10.24, [2, 4]	[2, 6], 11.12, [3, 5]	[5, 5], 12.24, [4, 6]	[1, 6], 13.10, [2, 5]	[6, 6], 15.00, [5, 5]

12. iterace

Open:

[5, 6], 17.41, [4, 6]	[3, 7]	J, 18.00,	[4, 6]	[5,	7],	17.00,	[4, 6]	[2,	7],	19.0	0, [3	3, 6]	[1,	7],	21.	00,	[2.	, 6]
[5, 4], 21.16, [5, 5]	[6, 4]	, 22.00,	[5, 5]	[0,	5],	23.32,	[1, 6]	[0,	6],	17.0	8, [1	, 6]	[0,	7],	23.	00,	[1,	, 6]
[7, 5], 18.24, [6, 5]	[7, 6]	, 21.41,	[6, 5]	[6, ⁻	7],	16.00,	[6, 6]	[7,	7],	23.0	0, [6	6, 6]	[7,	4],	25.	16,	[6	, 5]
Closed: [2, 4], 5.00, NULL	[3 5]	I 7 61 I	2 41	[4]	61	0 24 [3 51	[2	51	Q <u>/</u> /7	' [2	4 1	[3	61	10	16	[3	51
[3, 4], 10.24, [2, 4]								•					_					
[6, 5], 15.00, [5, 5]		j, 11.1 <u>2</u> ,	[0, 0]	[O, ·	Ο],	12.27,	[4, 0]	[υ,	Ο],	12.2	-т, [r, Oj	[Ο,	Ο],			[O,	, o ₁
[0, 0], 10.00, [0, 0]																		
13. iterace																		
Open																		
Open:																		
																	_	
Closed:																	_	
																_	_	
																	_	
																	_	
14. iterace																		
Open:																		
Орен.																		
															_	_	_	
Closed:																		
																	_	
																	_	
15. iterace																		
Open:																		

Closed:				
3. iterace				
3. iterace Open:				
Open:				
Open:				
Open:				