Sofya Aksenyuk 150284

03 II 2022 AI

ex. 1.

Random sequential algorithm (for vertex coloring) has no graph hard to color, since graph is considered to be hard to color if any algorithm implementation for this graph colors it <u>not</u> optimally. But since random sequential algorithm's worst case is $S_{RS}(G) \geq O(n)$, it colors a graph optimally, regardless of what implementation is used.

ex. 2.

The consequences of described algorithms for the P = NP, P ≠ NP open question is that, as for P = NP, such problem can be solved using DTM which gives us polynomial time. But as for P ≠ NP, we cannot be sure in that. Such algorithms don't prove P = NP initially. If A exists then P = NP.

~~m~~ Sofya Aksenyuk 150284.
03 II 2022 AI.

ex. 3.

a) $\Delta + 1$ always (greedy way of solving it)
~~can be checked in polynomial time~~

b) Δ if graph got no clique of size $w(G) = \Delta + 1$ as well as it is not a odd length cycle.

c) 2 colors, where Δ is graph degree is true for bipartite graphs.

a) can be checked in polynomial time.

b) can't be checked in polynomial time since clique is NP-Hard.

c) ~~[illegible]~~ bipartite graphs can be checked in polynomial time.

Sofya Aksenyuk 150284

03 II 2022 AI

ex. 4.

1.

	0	1	2	3	4	5
0	0	1		5		
1		0			4	3
2	2	3	0	7		1
3		9	2	0		
4	3	4		8	0	
5			3	8		0

2.

	0	1	2	3	4	5
0	0	1		5	5	4
1		0			4	3
2	2	3	0	7	7	1
3		9	2	0	13	12
4	3	4		8	0	7
5			3	8		0

3.

	0	1	2	3	4	5
0	0	1		5	5	4
1		0			4	3
2	2	3	0	7	7	1
3	4	5	2	0	9	3
4	3	4		8	0	7
5	5	6	3	8	10	0

4.

	0	1	2	3	4	5
0	0	1	7	5	5	4
1		0			4	3
2	2	3	0	7	7	1
3	4	5	2	0	9	3
4	3	4	10	8	0	7
5	5	6	3	8	10	0

5.

	0	1	2	3	4	5
0	0	1	7	5	5	4
1	7	0	14	12	4	3
2	2	3	0	7	7	1
3	4	5	2	0	9	3
4	3	4	10	8	0	7
5	5	6	3	8	10	0

6.

	0	1	2	3	4	5
0	0	1	7	5	5	4
1	7	0	6	11	4	3
2	2	3	0	7	7	1
3	4	5	2	0	9	3
4	3	4	10	8	0	7
5	5	6	3	8	10	0