Discrete Optimization

Hanoi Dec. 2011

Assignment #12

Due: 8 ,December, 2011

1. Construct a sequencing of the vertices of the complete bipartite graph $K_{20,20}$ For which the greedy coloring algorithm will use at least 10 colors.
2. An instance of 3-SAT has 1000 Boolean variables and 10,000 clauses. We have the 3-coloring "black-box." We would like to use it to test whether our instance is satisfiable. How many vertices and how many edges will the corresponding graph have?
3. Here is a matching in the graph below:
   (1,3), (2,7), (4,8), (5,31), (6,30), (9,21), (10,16), (11,23), (12,18), (13,14), (15,29), (17,25), (19,28), (20, 27), (24,26).
   Can you find a perfect matching in this graph?
4. This is the adjacency list of a graph of order 32, regular of degree 7.

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 1: [3, 6, 10, 15, 22, 26, 28]
 2: [7, 9, 16, 22, 24, 27, 29]
 3: [1, 4, 9, 16, 18, 23, 32]
 4: [3, 8, 10, 13, 15, 19, 30]
 5: [7, 11, 15, 16, 19, 20, 31]
 6: [1, 14, 17, 24, 25, 30, 31]
 7: [2, 5, 9, 12, 14, 17, 31]
 8: [4, 13, 18, 20, 24, 25, 29]
 9: [2, 3, 7, 12, 21, 22, 31]
10: [1, 4, 12, 14, 16, 17, 22]
11: [5, 12, 20, 23, 26, 29, 32]
12: [7, 9, 10, 11, 18, 24, 32]
13: [4, 8, 14, 21, 23, 25, 26]
14: [6, 7, 10, 13, 19, 21, 30]
15: [1, 4, 5, 23, 26, 28, 29]
16: [2, 3, 5, 10, 22, 27, 31]
17: [6, 7, 10, 18, 21, 25, 28]
18: [3, 8, 12, 17, 24, 30, 32]
19: [4, 5, 14, 21, 22, 26, 28]
20: [5, 8, 11, 27, 28, 29, 30]
21: [9, 13, 14, 17, 19, 23, 31]
22: [1, 2, 9, 10, 16, 19, 23]
23: [3, 11, 13, 15, 21, 22, 32]
24: [2, 6, 8, 12, 18, 25, 26]
25: [6, 8, 13, 17, 24, 27, 30]
26: [1, 11, 13, 15, 19, 24, 29]
27: [2, 16, 20, 25, 28, 29, 32]
28: [1, 15, 17, 19, 20, 27, 32]
29: [2, 8, 11, 15, 20, 26, 27]
30: [4, 6, 14, 18, 20, 25, 31]
31: [5, 6, 7, 9, 16, 21, 30]
32: [3, 11, 12, 18, 23, 27, 28]
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   a. Color the vertices using no more than 7 colors. Explain your strategy.
   b. Color the edges using no more than 8 colors. Use the table below for a greedy coloring. Use a second copy of the table to show the changes you made in order to find the final coloring.

	A	B	C	D	E	F	G	H
1								
2								
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