

Notable Problems of CMB

1. Find an algorithm to recognize a graph which is a bipartite interval graph. (To recognize a graph with given constraints is difficult in general, for example, planar graphs, 2-connected graphs, ..., etc.)
2. Let G be a bipartite graph with 2^k edges. Find an algorithm of finding an induced subgraph with 2^{k-1} edges for each positive integer.
3. Let v be a vertex of even degree in a balanced colored graph. Prove that the edges incident to v can be paired off into $\deg(v)/2$ pairs such that edges in the same pair have different colors. **Can we do it for all vertices simultaneously?**

Continued

4. Find the number of alternating Eulerian circuits in a bicolored Eulerian graph. (Note that the number of directed Eulerian circuits in a directed Eulerian graph has an explicit formula.)
5. Find a physical map of three enzymes A, B and C given seven sets of experimental data from digestions A, B, C, AB, BC, CA, and ABC. (This is a generalization of the Double Digest Problem.)
6. Does a polynomial algorithm exist for Partial Digest Problem (PDP)?
7. There are homo-metric sets for the answers of PDP on n -elements. Let $H(n)$ denote the maximum number of strongly homo-metric sets. Determine $H(n)$. (It is known that $0.5n^{0.6309} \leq H(n) \leq 0.5n^{2.5}$.)

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8. Design an efficient algorithm to recognize circular-arc graphs.
9. Does there exist a polynomial algorithm for SBH sequence reconstruction by binary arrays?
10. Estimate the number of different alignments between two n -letter sequences.
11. Find an optimal alignment of circular strings.
12. Describe a winning strategy for B in the best bet for simpletons.
13. Describe a winning strategy for A in the best bet for simpletons, that is the strategy which minimizes losses.

Continued

14. What if the game of simpletons with a biased coin?
15. Prove that 2-greedy is a performance guarantee for sorting by reversals.
16. Find the prefix reversal diameter of the symmetric group, that is the set of all permutations.
17. Find the transposition diameter of the symmetric group.
18. Design an algorithm to find an integer in $[1, 10^6]$ by asking queries and one lie is allowed. (Group Testing)
19. Design an algorithm to find two integers in $[1, 10^6]$ by asking queries and one lie is allowed. (Group Testing)
20. What if more lies are allowed?