Algorithms Qualifying Exam Topic

Fall 2014

The following problems are known to be NP-Complete.

- 3-CNF-SAT
- BIN-PACKING
- CLIQUE
- INDEPENDENT-SET
- HAM-CYCLE
- K-COLOR
- KNAPSACK
- MAXIMUM-MATCHING
- SET-COVER
- SUBSET-SUM
- TSP
- VERTEX-COVER

In preparation for the QE, students should become familiar with these problems (some of them are covered in CS 5633). The exam will consider a variant of exactly one of the NP-complete problems from this list. The variant may be able to be solved in polynomial time. The students should propose algorithms for this problem that solve the problem (exactly or approximately) using one or more approaches (such as divide-and-conquer, greedy, dynamic programming, graph traversal, shortest path, max flow, etc). The goal should be to clearly demonstrate strong critical thinking skills regarding algorithms. Students should argue why a some approach may be reasonable, why some approaches may not be reasonable, and provide a critique of their solution.