15-750: Graduate Algorithms	Manuel Blum, Virginia Vassilevska, Chris Wang
Midterm Exam 2	March 30, 2005

Name:

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Instructions:

- This is a closed book exam. No calculators or laptops are allowed. Absolutely no collaboration.
- Do all your work including scratch work on the pages of this exam.
- There are 5 problems and 7 pages, including this page.
- The exam is graded out of 100 points. Not all answers listed are possible.
- If you use anything not proven in class, please provide a proof.
- In any reduction you may only use one of the following NP-complete problems: 3SAT, SAT, Clique, Independent Set, Vertex Cover, Hamiltonian Cycle, Hamiltonian Path, Graph Coloring, MAX-TSP, Set Cover, Partition
- You may use the Cook's Theorem.
- You should explain all your answers. However, we only ask for a rigorous proof in the second [45pts] questions.

1. (10pts) This will be a question identical to a problem in previous homeworks or midterm.
2. (45pts)
3. (15pts)
4. (15pts)
5. (15pts)
6. (Bonus 5pts)
7. (Bonus 5pts)

Happy April Fool's Day!