Name:

E-mail:

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!