Computer Science 789 Randomized Algorithms Fall 2004 Final Examination November 16, 2004

No books, notes, scratch paper, or calculators. Use pen or pencil, any color. Use the rest of this page and the backs of the pages for scratch paper. If you need more scratch paper, it will be provided.

1. (Easy Problem)

2. (Easy Problem)

3. Work two of he following three problems.

   (a) Prove that no randomized trackless algorithm for the 2-server problem has competitiveness less than 1 + sqrt(2)/2, which is approximately 1.707.

(b) Prove that the expected number of comparisons needed to find the k^{th} item in a set of n items is no greater than $4n$.

(c) Prove that no randomized algorithm for the k-cache problem can have competitiveness less than H_k.