

ICS 280—Spring 2005
Approximation Algorithms
Homework 3
Due: June 9, 2005

1. Show that if we remove Step 4 in Algorithm 18.4, there is no constant bound on the approximation factor. (This is part of problem 18.5 in the text.)
- *2. Suppose that, even in the case where the matrix may not be symmetric, we define a real $n \times n$ matrix A to be positive semidefinite if for all nonzero vectors x we have $x^T A x \geq 0$. Show how one could test for this property quickly, assuming that one can quickly test whether a symmetric matrix is positive semidefinite.
Hint: don't jump to the conclusion that this is hard just because it has a *.
3. Do problem 29.3. Of course, your proof should not make use of the fact that $\mathbf{NP} = \mathbf{PCP}(\log n, 1)$ has already been proved.

Generally I want you to work alone on the starred problems. You may consult with other people or look up the solution in a journal, but then you must report this on your homework and will receive less credit.

For the unstarred problems, feel free to work with other students as you wish, but please write the solution you turn in yourself, and be sure you yourself understand it.