Algorithms – CS-27200/37000 Homework – February 25, 2005
Instructor: László Babai Ry-164 e-mail: laci@cs.uchicago.edu

TA SCHEDULE: TA sessions are held in Ryerson-255, Tuesday and Thursday 5–6pm, Saturday 11am–noon, and (this is new) **Wednesday after class** 12:30–1:20 or 1:30–2:20 depending on demand. Indicate your interest in the Wednesday session to the instructor immediately after class. (The Wednesday evening sessions are discontinued.)

ADVICE. Take advantage of the TA sessions.

Check the class website, http://www.classes.cs.uchicago.edu/current/27200-1.

READING.

(U,G) B-trees (text, Chap. 18; especially 2-3-4-trees (text, p. 439 and 453)) (due for the final exam).

(G only): Finding the convex hull (text, Chap. 33.3, pp 974-957) (due for the final exam).

Graduate students: review the proof of the Cook-Levin Theorem (NP-completeness of satisfiability) and apllications to other NP-completeness proofs of CLIQUE, HAMILTON CYCLE, SUBSET SUM, 3-COLORABILITY (Ex. 34.3, page 1019).

DATES TO REMEMBER: Mon Mar 7: Midterm 2, Fri Mar 11: Last class. ATTENDANCE REQUIRED. Fri Mar 18, 10:30–12:30: Final Exam

17.1 (10 points) Recall that (0,1)-ILP stands for the question "Does a given linear program (system of linear inequalities) with integer coefficients have a $(0, 1)$-solution (i. e., a solution where all variables take the value 0 or 1)?" See more about linear programs in homework problem 14.1.

Prove that (0,1)-ILP is NP-complete, assuming that we already know that 3-COL (graph 3-colorability) is NP-complete.

17.2 (G only, 10 points) Given the positive integers k, m (in binary), compute $F_k \bmod m$ in polynomial time. (This means that if both k and m are integers with $\leq n$ digits, your computation should take no more than n^C bit-operations.) *Hint.* Use 2×2 matrices.