

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.

**TA schedule during exam week:** TA sessions will continue through March 18 (final exam) on the same schedule. On Wednesday, March 14, Hari will be available both at 12:30 and at 1:30pm.

**ADVICE.** Take advantage of the TA sessions.

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

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

19.1 There was a mistake in the statement of Problem 16.3. (The reduction as originally stated went the wrong way.) This is a reassignment of the problem. If you received full score on 16.3, you do not need to hand in a solution to 19.1; you points for 16.3 will be credited toward 19.1. If you did not receive full score on 16.3, please solve 19.1; you will neither gain nor lose points for your solution to 16.3.

Recall that a Cook-reduction of a function  $f_1 : \Sigma_1^* \rightarrow \Pi_1^*$  to a function  $f_2 : \Sigma_2^* \rightarrow \Pi_2^*$  is a polynomial-time algorithm to compute  $f_1$  with “oracle access” to  $f_2$ , i. e.,  $f_1$  is permitted to use  $f_2$  as a “subroutine.” ( $\Sigma_1, \Pi_1, \Sigma_2, \Pi_2$  are finite alphabets.) Note that whenever  $f_1$  uses a call to  $f_2$ , the algorithm needs to compute the input to  $f_2$  and read its output; therefore these inputs and outputs must have length, polynomially bounded in the original input length.

- (a) (8 points, G only) Give a Cook-reduction of the problem of finding a 3-coloring of a given graph if a 3-coloring exists (not a decision problem) to the problem of graph-3-colorability (a decision problem).
- (b) (U, G, 3 points) Prove that no such Karp-reduction exists.