

HW 11 CMSC 452. REALLY DUE Tuesday May 11

1. (10 points) What is your name? Write it clearly. Staple your HW. When is the final? WHEN IS THE HW REALLY DUE?
2. (30 points)
 - (a) (15 points) Show that if $A \leq_m B$ and $B \leq_m C$ then $A \leq_m C$.
 - (b) (15 points) Show that if $A \leq_m^p B$ and $B \leq_m^p C$ then $A \leq_m^p C$.
 - (c) (0 points but I want you to think about it) Prove a general theorem from which parts a and b of this problem are easy corollaries.
3. (30 points) M is a polytime TM that is being used for the set C in my proof of Cook's theorem. Let $\delta(q, a) = (p, L)$ be a transition in M . Write the Boolean Formula that enforces this in the proof of Cook's Theorem.
4. (30 points) Let

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- (a) Show that $3\text{-COL} \leq_m^p 4\text{-COL}$. (That is, describe how to take a graph G and produce a graph G' such that G is 3-colorable IFF G' is 4-colorable. (NOTE- for this problem you CANNOT assume that either problem is NPC.)
- (b) For this problem ASSUME that $SAT \leq_m^p 3\text{-COL}$. Show that $4\text{-COL} \leq_m^p 3\text{-COL}$.