CMSC 652 HW 1-REDO Morally Due March 4

100 points

Let $M_1, M_2, \ldots$ be a list of all Turing machines. We then take M_i and clock it so that after time n^i (n is the length of the input) it will just stop and output NO. Further modify these machines so that they can only output YES or NO. (e.g., if they output 1, thats a YES, anything else is a NO). Show there exists a decidable set A such that

for all i, M_i and A DIFFER infinity often.

CMSC 652 HW 4-WRITTEN Morally Due March 4

50 points

Show that if $P \neq NP$ then there exists two sets $A, B \in NP$ such that A is NOT reducible to B, and B is NOT reducible to A. (HINT: Both A and B will be constructed by blowing holes in SAT. To make A NOT reducibld to B make A look like SAT and B look empty. To make B NOT reducibld to A make B look like SAT and A look empty.)

CMSC 652 HW 4-ORAL Due March 6

50 points

Prove that $NSPACE(\log n) \subseteq DSPACE((\log n)^2)$. The proof must be from first principles (e.g., you can't say 'this follows from Savitch's theorem') HINT- this is a special case of Savitch's theorem. You should look up Savitch's theorem, read it, and understand it completely. It first appeared in *Relationship between nondeterministic and deterministic space classes* by Savitch, Journal of Computing and Systems Sciences, Volume 4, 177-192, 1970. It is also in most complexity theory textbooks and there are probably notes on line about it.

Th 10-11: Jesse M, Emily H, Yi Q,

Th 11:00-12:00 Casey M, Leo F, Hoseein E.

Th 3:30-4:30 Bahadir O, Ahmed A, Ilse H

(IF you want to switch around you can, but I am meeeting SOME three students 10-11, SOME three students 11-12, and SOME three students 3:30-4:30.)

NOTE- the HW05 Oral HW will be the same timeslot- each one should just take 30 minutes.