CSC 373 Lecture 17

- Review: New topic NP sets (decision problems) and NP completeness. Motivation, Polynomial time, Polynomial time reduction

- Some simple reductions (mostly a board lecture today)

- NP sets and NP completeness

- NP vs co-NP

Some definitions and notation (mainly on the board)

- A polynomial time reduction (called a polynomial time Turing reduction)

- A polynomial time transformation - special case of a poly time reduction (called a "many to one poly time reduction)

- Simple observation we already made : If problem X poly time reduces to problem Y, then if Y is computable in poly time then so is X. The contrapositive is that if X is not poly time computable then Y is not poly time computable.

- Note: poly time reduction and transformation are transitive relations.

Some relatively easy transformations

- Vertex cover transforms to independent set and conversely, independent set transforms to vertex cover. Independent set and clique transform to each other.

- Note: these are NP complete problems and all such problems can theoretically be reduced to each other. But here the reduction in both directions is immediate.

- SAT to 3-SAT (Clearly here the converse holds.)

- 3-SAT to IS (independent set). Why noteworthy?