CSC 341: Automata, Formal Languages, and Complexity Theory

Worksheet #01

Name _____

1 Review

Answer the following questions:

1. In few sentences state the objectives of this class.
2. Name the central areas of the theory of computation. Define each area in one/two sentence(s).
3. Think of a real-life problem (A) that can be reduced to another problem (B) which you have already learnt in the some of the previous classes.
4. We have two problems at hand:
   (a) Sort the list of enrolled students of a class in alphabetic order of their names.
   (b) From an undirected graph, find the largest clique. *(Note: A clique of a graph G is a complete subgraph of G.)*

   Are both of the problems equally difficult? Why/why not? Just put down your thoughts. Your statement (at least at this moment) does not have to me mathematically proven.

2 Proof Techniques

Using either construction/contradiction/induction strategy, prove that

Theorem. *Two integers a and b are consecutive if and only if $b = a + 1$. You can safely assume that $b > a$.*

2.1 Solution: Proof by Contradiction

Let us assume that a and b are two consecutive integers and $b = a + m$, where $m \neq 1$. Since 1 is the smallest positive integer, we assume that $m > 1$. Now if we look at the natural number series, there are $(m - 1)$ distinct number, $a + 1, a + 2, \ldots, a + (m - 1)$, between a and b. Hence, we arrive at the decision that a and b are consecutive if and only if $m = 1$.