COT 4210 Fall 2014 Midterm#1 Topics

1. Properties of sets, sequences, relations and functions
   1. Basic notions
   2. Proof techniques
2. Computability, complexity, languages
   1. Basic notions
3. Finite state automata and Regular languages
   1. Definitions: Deterministic and Non-Deterministic
   2. Notions of state transitions, acceptance and language accepted
   3. State diagrams and state tables
   4. Construction from descriptions of languages
   5. Closures: negation, union, exclusive or, negation
   6. More closures: concatenation, star
   7. More closures: Reverse, Prefix, Postfix, Substring
   8. More yet: Max, Min
   9. Conversion of NFA to DFA
      1. λ-Closure -- E(s) and E(S)
      2. Subset construction
      3. Reachable states
      4. Reaching states
   10. Minimizing DFAs (distinguishable states)
4. Regular expressions and Regular Sets
   1. Definition of regular expressions and regular sets
   2. Every regular sets is a regular language
   3. Every regular language is a regular set
      1. Ripping states (GNFA)
      2. Ri,j(k)
      3. Regular equations
         1. Uniqueness of solution to R=Q+RP
         2. Solving for expressions associated with states
5. Pumping Lemma
   1. Classic non-regular languages {0n 1n | n >= 0}
   2. Formal statement and proof of Pumping Lemma for Regular Languages
   3. Use of Pumping Lemma
6. Grammars
   1. Definition of grammar and notions of derivation and language
   2. Restricted grammars: Regular (right and left linear); context free
   3. Why you can’t mix right and left linear and stay in Regular domain.
   4. Relation of regular grammars to finite state automata