MA/CSSE 474 Day 01 Summary

Main ideas from today:

1. Informal look at DFSMs (tennis scoring).
2. Recursive definition of *string* w:
   a. *w* = ε (empty string), or
   b. *w* = *ua*, where *u* is a string and *a* is a single symbol.
3. DFSM (d_______________ f________ s_______ m____________) "physical model":
   a. A finite tape; each square contains an input symbol.
   b. A finite control that can be in any one of a fixed (finite) set of states.
   c. The machine reads an input symbol, changes state, then moves right, to read next symbol on the tape.
   d. After reading the entire input, the machine halts and either accepts or rejects the string.
4. If Σ is a (finite) alphabet, Σ* is ____
5. Letters near the beginning of the English alphabet will usually stand for _______________
   Letters near the end of the alphabet will usually stand for __________________.
6. The 5 parts of a DFSM definition:
   a. K: _________________________________
   b. Σ: _________________________________
   c. δ: _____×_____→ __ ___________________ ______________
   d. s ∈ ___ _______________ ________________
   e. A ⊆ ___ _____________ ____________
7. Two main ways we can represent the transition function:

   __________________________ and ___________________________

8. Sometimes we omit drawing the dead state and its transitions, to keep the diagram uncluttered.
9. JFLAP is ____
10. State diagram for {w∈{0,1}* : w does not have two consecutive 1's}:

11. Extended transition function (from K × Σ* to K) has a recursive, two-part definition:
    a.
    b.
12. If M is a DFSM, L(M) =
13. To prove that two sets S and T are equal, we must show ________________ and _______________.
14. The contrapositive of "if X then Y" is:_____________________________
15. (Strong) mathematical induction: To prove property P(n) true for all integers $n \geq n_0$ (n_0 is often 0 or 1):
    a. Show that $P(n_0)$ is true.
    b. Show that for any $k > n_0$, if p(j) is true for all j with $n_0 \leq j < k$ (this is the IH), then P(k) is true.
16. Induction on the length of a string (or on the number of transitions in a machine or the length of a derivation) will be a very useful proof technique in this course. Use the back of this page for the class example.