CSCI 5832 Spring 2011 Exam 1

Name: _____

On my honor, as a University of Colorado at Boulder student, I have neither given nor received unauthorized assistance on this work. _____.

1. **(5 points) True/False:** It's been a little chilly lately.

2. **(5 points) True/False:** A formal language is a set of strings consisting of symbols from a specified alphabet.

3. **(5 Points)** Given a deterministic FSA M1 for a language L1, describe how you would construct a machine M2 to recognize L2, the complement of L1.

4. **(10 Points)** Given the stem "snow", give one example each of words that would result from the following kinds of morphological processes involving snow:
   a) **Compounding:**
   b) **Inflection:**
   c) **Derivation:**
5. **(10 points)** Consider the problem of using an FST to downcase English text. For example, we'd like a tape containing (as a sequence of characters) "The next three Mondays" to be paired with the tape "the next three mondays".
   a) Succinctly, describe an FST that can perform this task. Use the back. You don't need to include every last transition. Just enough to show the basic idea.
   b) Is there a fundamental difference in how this FST behaves based on the tape from which it is reading and writing? Explain on the back
6. **(5 points)** Consider an FST that pairs strings possibly containing English number words with strings containing their numeric equivalent. As in "three Mondays" with "3 Mondays". Given the machine from question 5 and this machine, how would you go about constructing a machine that both downcases and converts number words to numbers?

7. **(10 Points)** Given the data on the attached page, what probability would be assigned to the sequence "to wink and drink" by a bigram language model (with no smoothing)? Ignore the issue of start and end sentence symbols. Just use the unigram of the first word to start. Don't count bigrams across sentence boundaries. You can leave your answer in the form of fractions if you like. Use the back.

8. **(5 points)** What algorithm computes the following value for an observation sequence O given an HMM model M.

$$P(O \mid M)$$