CS1573 Midterm Exam Practice (will be closed book)

1. Quiz questions are good practice (but for exam they will be graded stringently)
2. You should be able to trace through algorithms (figures) discussed in class
3. Empirical methods will be multiple choice, if at all
4. What is true of the string "I am natural a language student processing of"?

   (a) It is syntactically invalid.

   (b) It is typically accepted or rejected as grammatical from a finite state machine.

   (c) It is typically accepted or rejected as grammatical from context-free rules.

   (d) It illustrates the importance of word order for syntactic analysis.

   (e) None of the above.

   (f) Two or more of the above (and circle them all).
5. The definition of a finite-state automaton includes all of the following EXCEPT which one?

   (a) Finite set of states.

   (b) Finite input alphabet.

   (c) Finite output alphabet.

   (d) Initial state.

   (e) Set of final states.

   (f) Transition function.
6. To accept a given string, a finite-state automaton must:

   (a) be in an accept state regardless of the position of the tape pointer.

   (b) be in an accept state AND the position of the tape pointer must be at the end of the input string.

   (c) be in an accept state OR the position of the tape pointer must be at the end of the input string.

(d) be in a reject state AND the position of the tape pointer must be at the end of the input string.

(e) be in a reject state regardless of the position of the tape pointer.

7. In the example *The stock exchange wouldn't talk publicly about the latest scandal*

   (a) a metaphor/metonymy is being used

   (b) the sentence semantics can be computed compositionally

   (c) the sentence is ambiguous

   (d) none of the above

   (e) two or more of the above (and circle them all)

8. What does conversational dialogue involve that makes it different from (monologue) discourse?

   (a) Turn-taking

   (b) Syntax

   (c) Grice's maxims

   (d) Transition relevance places

   (e) None of the above.

   (f) Two or more of the above (and circle them all).

9. List as many ways as you can think of to convey the time expression "3:45 p.m." in English. Draw a regular expression, a deterministic finite state automaton (or state transition table), and a non-deterministic automaton that recognizes these.

10. Consider the following sentences:

    (a) I bought the coat with the coins.

    (b) The door are open.

    (c) The doors eat ice cream.

    For each sentence, state whether it is

    - (1) syntactically ambiguous

- (2) syntactically incorrect
- (3) both of the above
- (4) none of the above

Explain your answer for each sentence.

11. (a) Describe the relationship between a non-deterministic automaton and two well-known search strategies.

    (b) Why might we want to make a parser be a hybrid of a top-down and a bottom up approach?

12. Assume the following CFG production rules, and the input "flying purple people eater ate"

    - S $\rightarrow$ NP V
    - NP $\rightarrow$ ADJ NP
    - NP $\rightarrow$ N
    - NP $\rightarrow$ NP N
    - N $\rightarrow$ people
    - N $\rightarrow$ eater
    - ADJ $\rightarrow$ flying
    - ADJ $\rightarrow$ purple
    - ADJ $\rightarrow$ people
    - V$\rightarrow$ ate

    (a) Given the input, grammar, and lexicon above, show a top-down and bottom-up parse. Select the rules in the order given, and indicate ALL parts of the search.

    (b) Draw a second possible parse tree for the input (here just show the final tree rather than the whole search space).

    (c) Extend the coverage of the grammar and lexicon to deal with the sentence "The eater ate the pizza"

13. Explain the following Who's On First Abbot and Costello routine from the beginning of Chapter 19, in terms of dialogue act misinterpretations and other concepts discussed in class. This routine is usually spoken; the capitilization and punctuation reflects the intended dialogue acts of the speaker.

    C: I want you to tell me the names of the fellows on the St. Louis team.

    A: I'm telling you. Who's on first, What's on second, I Don't Know is on third.

    C. You know the fellows' names?

    A. Yes.

    C. Well, then, who's playing first?

    A. Yes.

    C. I mean the fellow's name on first.

    A. Who.

    C. The guy on first base.

    A. Who is on first.

    C. Well what are you askin' me for?

    A. I'm not asking you - I'm telling you. Who is on first.

14. Consider the following fragment from the telephone conversation between a client (C) and a travel agent (A) discussed in the text and in class:

    *C1: . . . I need to travel in May.*
    *A1: And, what day in May did you want to travel?.*
    *C2: OK uh I need to be there for a meeting that's from the 12th to the 15th.*

    (a) Sketch (in English) how an inferential approach would be used to determine that C2 answers the question from A1.

    (b) Point out a place in the example above where either the Client or the Travel Agent is establishing common ground.

    (c) Suppose that one day I started to give my lecture in class, but forgot to turn on the projector for displaying the computer screen. Construct an example indirect speech act for requesting that I turn on the projector. Explain why your example is an indirect speech act.

15. Consider a dialog with an airline travel agent that begins with the following utterances:

    *System: Welcome to the flight reservation system. How may I help you?*
    *User: Please, I want to reserve a flight.*

    1. Sketch how a plan-inferential approach would tag the dialogue act behind the user's utterance.

    2. Sketch how a cue-based model might tag the dialogue act.

    3. Give an example system response that is an appropriate response to the inferred dialogue act, and that also handles grounding.

    4. Give an example system response that *only* handles grounding, and that uses a different grounding method than your answer above.

    5. Write a dialog manager that can handle the initial dialogue and your response to question 3 (but ignoring grounding), using the finite-state machine formalism.

16. Exercise 22.9 from R&N