COGS 200 - Assignment 3

Hard copies to be submitted in class, and electronic copies via Connect, on 6 November.

Your answers to the following questions must be entirely your own, although you should feel free to discuss them with other students in the course, either in person or via the Connect discussion board. Give citations for any sources that you use. Please make your answers complete, but concise.

1a. Consider the following pairs of sentences:

> (1) *I wrote a letter to Bob.   I wrote Bob a letter.*
> (2) *Jane gave me some cake. Jane gave some cake to me.*
> (3) *The teacher sent a package to her friend. The teacher sent her friend a package.*

Describe one transformation that could relate the two sentences in the pairs. (2 points)

1b. Now consider this pair of sentences:

> (4a) *He mailed a note to Germany.*
> (4b) *?He mailed Germany a note.*

Does your transformation capture the intuition that (4b) is a little odd? If it does, how does it? If it doesn't, why not? (2 points)

1c. Finally, consider this pair of sentences:

> (5a) *Joe addressed the letter to Ed's home address.*
> (5b) **Joe addressed Ed's home address the letter.*

Does your transformation capture the intuition that (5b) is "bad" or "ungrammatical"? If it does, how does it? If it doesn't, why not? (2 points)

1d. How would an exemplar approach capture (i) the relationship between the pairs of sentences in (1), (2), and (3)? (ii) the oddness of (4b)? and the "badness" of (5b)? (3 points)

2a. Briefly describe a real-world example of a COGS-type project that depends upon the frequentist interpretation of probability. Include an appropriate reference. Make clear what about the approach makes the interpretation frequentist. (3 points)

2b. Briefly describe a real-world example of a COGS-type project that depends upon the Bayesian interpretation of probability. Include an appropriate reference. Make clear what about the approach makes the interpretation Bayesian. (3 points)

3. Suppose you heard someone say, "I saw the man with a telescope." How would an exemplar approach describe your ability to **understand** the ambiguity in that sentence? Could an exemplar approach **resolve** the ambiguity (that is, decide which meaning is intended by the speaker)? If so, how? If not, why not? (6 points)

4. The exemplar approach to representing linguistic knowledge uses probability to rank the likelihood of producing or understanding utterances. Describe a situation in which a simple probability calculation would be insufficient to adequately characterize the linguistic situation. (5 points)

5. Give one example of a system that represents several facts, and that employs representations of these facts that are *overlapping*, but not *holographic*. Briefly explain your answer. (6 points)

6. Briefly describe an experimental procedure that might be used to test the psychological reality of the two-route model of English past tense formation. (6 points)

7. In your own words, briefly describe the distinction between the "two cultures of statistical learning" that Norvig talks about in his essay, "On Chomsky and the two cultures of statistical learning." (6 points)

8. In last term's Wednesday COGS 300 lab there were 10 males and 8 females. In the Monday COGS 300 lab there were 5 males and 11 females. To balance the numbers, a student was randomly selected from the Wednesday lab and transferred to the Monday lab. Subsequently, a student was randomly selected from the Monday lab and, it turned out, the student selected was male. What now is the probability that the student originally transferred from the Wednesday to Monday lab was male? [Hint: Use Bayes' theorem.] (6 points)