Assignment 7
L445 / L545 / B659
Due Thursday, April 14

0. Turn in your project topic (on **Tuesday, April 12**), along with a list of bullet points outlining the specific steps you’re going to take.

1. **[Moved from last assignment:]** Explain how Earley parsing avoids the left recursion problems which plagued top-down parsing.

2. This page provides a way to implement a reverse function in Prolog:
   
   http://www.cse.psu.edu/~catuscia/teaching/cg428/exercises/Prolog_solutions.html
   
   It gives two solutions:

   % Naive, inefficient (quadratic) solution:
   naive_reverse([],[]).
   naive_reverse([X|L],K) :- naive_reverse(L,M), append(M,[X],K).

   % Fast (linear), tail-recursive solution:
   fast_reverse(L,K) :- rev_aux(L,K,[]).
   rev_aux([],K,K).
   rev_aux([X|L],K,M) :- rev_aux(L,K,[X|M]).

   Explain in prose how the `fast_reverse` function is able to efficiently reverse a list.

3. Working in groups of 2–3, implement a small DCG for the following sentences ([http://www.gutenberg.org/ebooks/219](http://www.gutenberg.org/ebooks/219)). Be sure that it not only recognizes the sentences, but also returns a parse. (Feel free to ignore sentence-internal punctuation.)

   The Nellie, a cruising yawl, swung to her anchor without a flutter of the sails, and was at rest. The flood had made, ...and ...the only thing for it was to come to and wait for the turn of the tide.

4. Given the following feature structures (f, g, and h), answer the questions in (a) and (b):

   
   ![](attachment:image.png)

   (a) Give the feature structure which is the result of unifying each of the following:

   i.  $f \sqcup g$
   ii.  $f \sqcup h$
   iii.  $g \sqcup h$
   iv.  $(f \sqcup g) \sqcup h$

   (b) Does $h$ subsume $f$? Why or why not?