# Lab 3: CFG, CNF, and CKY (oh my!)

September 28th 2017

In this lab you'll use the CKY algorithm to parse and generate sentences from the provided context-free grammar. Please turn in your solution by midnight on 10/4/17. There is no programming required for this assignment. Solutions should be written/typed up and submitted as a pdf. If you are going to write up the assignment I MUST be able to read your handwriting.

**Part 1: 30 points**

```
(1) S -> NP VP
(2) S -> NP VP PP
(3) NP -> det n
(4) NP -> n
(5) NP -> NP PP
(6) VP -> aux VP
(7) VP -> v NP
(8) PP -> p NP
```

The grammar given above is not in CNF. Modify it into a CNF grammar that accepts the same language.

**Part 2: 40 points**

Run the CYK parsing algorithm on the input "`det n aux v n p det n`", showing the two-dimensional table that is constructed by the algorithm. Each entry in your table should indicate which grammar rule has been applied and to where the constituents lie in the table.

**Part 3: 10 points**

How many different parse trees does the algorithm construct? How is this indicated in your table?

**Part 4: 10 points**

Convert one of the possible parses into a treebank parse of the original grammar (i.e. not the CNF version you created).

**Part 5: 10 points**

Add some rules to your grammar that include a lexicon of actual words that can be substituted for the various parts of speech. Generate three new sentences from this grammar.

## Step 7

Turn in a pdf of your solution. Submit this using the command:

provide comp150nlp cfgcky cfgcky.pdf