HW05: Unification

Hand in at: `http://www.cs.utah.edu/~hal/handin.pl?course=cmsc723`. Remember that only PDF submissions are accepted. We encourage using LaTeX to produce your writeups. See `hw00.tex` for an example of how to do so. You can make a `.pdf` out of the `.tex` by running "`pdflatex hw00.tex`".

1 Non-Unification Grammar

Start with the following, basic CFG:

```
S    -> NP VP
NP   -> Det Noun
NP   -> Pro
VP   -> Verb
VP   -> Verb NP
Pro  -> I | you | she | we | they | me | her | us | them
Noun -> sandwich | sandwiches | fruit | apple | apples
Det  -> the | a | an | many
Verb -> eat | eats | ate | like | likes | liked
```

There are some problems with this grammar, including (at least):

- Det/Noun number agreement ("a sandwiches" or "many apple")

- Subject/Verb number agreement ("they eats")

- Pronoun case ("us ate" or "eats I")

- Determiner spelling ("an sandwich" or "a apple")

- Subject/Verb person agreement ("I eats")

Add sufficient features to this grammar to capture the above phenomena. Namely, augment the lexical items with their feature values (warning: some are underspecified, for instance "fruit" can be singular or plural). Then, for each production, state which features of constituents need to be unified (eg, "for NP -¿ Det Noun" we need to unify the *blah* feature from Det and Noun).

Based on your grammar, construct parse structures for the following sentences, and list the features at each node in the tree (terminals, pre-terminals, internal nodes and root). For those that don't parse, say where unification fails.

- I eat many sandwiches

- A sandwich likes the fruit

- We ate the sandwich

- *I ate a sandwiches

- *Us likes a sandwich

- *I like a apple