

### HA (NPs Referring Expr)

This is a pencil and paper assignment, to be done manually. You do not have to submit it, however, trying it out by hand will be very important for learning.

1. Identify the referring expressions in the following:

- (a) The big robot lifted the red cube.
- (b) The robot lifted the red cube besides the yellow pyramid.
- (c) The robot placed the red cube besides the yellow pyramid on the blue cylinder.
- (d) Every yellow sphere is on a yellow cylinder.
- (e) Put the red cube besides the yellow pyramid on the blue cylinder.

2. Show the dependency structure of each of the sentences above.

3. For each of the nouns and adjectives occurring in the sentences above, create the semantic dictionary entry. (As explained, the semantic entry shows the mapping from word to well formed formula in logic (predicate argument structure).)

4. For noun phrases (represented as subtrees in dependency trees rooted on nouns) in each of the dependency trees above, show steps for generating logical well formed formulas.

5. For an imperative sentence like (e), how would you process the sentence as a whole, including the verb in it? How would it differ from the processing of a declarative sentence.