Ex. 1

Given the alphabet $\Sigma = \{a, b, c\}$, propose a context-free grammar for the language of all words containing only as and bs, and such that the number of as is different from the number of bs.

Ex. 2

A noun phrase is either a determiner followed by a noun or a noun phrase followed by a prepositional phrase. A prepositional phrase is a preposition followed by a nous phrase.

1. Write the grammar G of noun phrases.
2. Write the two derivation trees that G associates with the word D N P D N P D N where D is the symbol for the category "determiner", N for "noun" and P for "preposition".
3. How many derivation trees does the word D N P D N P D N P D N have?
4. Which of the two trees of question (b) would you choose to represent the structure of the NP "le chat de la voisine de la concierge"?
5. Propose a grammar G', different from G, that associates to D N P D N P D N only the analysis that you've identified in the previous question.
6. Discussion: does this proposal seem an adequate way to solve the problem?
7. Assuming that D, N and P are terminal symbols, propose a regular grammar equivalent to G'.