Exercises 8
28.04.2014

Rules: The document contains a set of 5 exercises: each of them worth 2 points. You need to provide a *separate* PDF file for each exercise from 1 to 4, and a Python script for Exercise 5. All files must be compressed in a ZIP archive, named FirstName_LastName_ex*n*.zip, where n is the number of the exercise session (see ex_set_1.pdf). The ZIP file must be uploaded on ILIAS until the specified deadline.
Good luck!

Use the following grammar and lexicon for Exercises 1 and 2:

Grammar	Lexicon
S → NP VP S → Aux NP VP S → VP NP → det NOM NP → PropN NOM → noun NOM → noun NOM NOM → NOM PP PP → prep NP VP → verb NP VP → verb	noun → book | flight | meal | money verb → book | include | prefer Aux → does prep → from | to | on PropN → Huston | TWA det → that | this | a

Exercise 1. Give all parse trees created by the *top-down* parsing strategy for the following input sentences:

a) Book that flight
b) Does this flight include a meal?

Exercise 2. Give all parse trees created by the *bottom-up* parsing strategy for the following input sentences:

a) Book that flight
b) Does this flight include a meal?

Exercise 3. Build a grammar that accepts the following language:

$L = \{a^n b^n \mid n > 0\}$

where a^n denotes a string of n consecutive a's. The language is the set of strings having one or more a's, followed by the same number of b's.
Show that your grammar is correct on a suitable string (e.g. aaabbb).

Exercise 4. Build a grammar that evaluates a simple math expression. The expression (which is the starting point for the grammar) can represent either addition, subtraction, multiplication or division, and the precedence rules should be respected. The expression will have Terms and Factors, and as terminals, numbers and variables.
Prove that your grammar is correct on an input of your choice (e.g. 1 + 2*a + b).

Exercise 5. Implement the grammar at Exercise 4 in Python, using the PyParsing module (http://pyparsing.wikispaces.com/).