# Laurea Magistrale in INFORMATICA
# Principi di Linguaggi di Programmazione
# Compilatori
### prof. M. Bellia

(tempo a disposizione: 2 ore – Totalizzare almeno la metà dei punti in ciascun esercizio)

**Esercizio 1**. Let L be the language of strings which begin with a sequence of "a" and are followed by either a sequence of "c" or a sequence of b, according to the following rues:
- if terminating with "c" then the number of "c" is the double of the number of "a";
- if terminating with "b", the number of "b" is less than the number of "a"

Write a non ambiguous, context-free, grammar defining L.

**Esercizio 2**. Let G be the grammar below:

    S::= S U | x
    U::= x U z | x z

(a) Show the Coll(1);
(b) Loocking at the collection:  1) is G an LR(1) grammar? (2) is G a LALR(1) grammar? (3) is G a SLR(1) grammar.

**Esercizio 3**. Let G be the following grammar:

    S::= prog B end
    B::= L B | L
    L::= x L | ;

Extend G into a translation scheme which associates to the attribute "list" of S, a list of pairs (i,ni) where i is the index of the i-th "L" that is traversed by top-down analyser of G, whilst "ni" is the number of "x" traversed during the traversal of such a "L".

**Exercise 4.** Extend the language Semplice with a comand for the iterator "for" a la C-language: In particular it must have the same syntactic structure and it is a non-determinate iterator that re-evaluates, at each iteration, the second, end-iteration, expression of the guard.