

Homework #4 due 8 April Tuesday before recitation , 2025

(1) (a) Consider a calculator that uses floating point decimal numbers with + and - signs as inputs and can do the four operations +, -, *, / as well as parentheses for forced priority. Describe a CFG that can express any computable arithmetic term that such a calculator (with unlimited memory to allow for expressions of any length) can accept.

(b) Draw the parse tree for the expression $(0.23 / (5+3.1) - 20) * 2$ according to your CFG

(2) Write down a CFG that can generate any Boolean expression using the 3 logical operators \wedge (AND) \vee (OR) and \neg (NOT) operating on Boolean variables x, y, z and constants T (True) and F (False). An example for such an expression E is :

$$\mathbf{E = x \vee y \wedge (T \wedge \neg z)}$$

(3) From the main text

Exercises 5.1.2 (b), (c) , 5.1.3, 5.1.4 , 5.1.7