

## **Homework #4** due 18 April , 2023

**(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 :

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

**(3)** From the main text

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