# TDT4205 Problem Set 3

Answers are to be submitted via Blackboard by March $6^{th}$.

# 1 Bottom-up parsing

Consider the following grammar:
$S \to T$
$T \to T + N$
$T \to T - N$
$T \to N$
$N \to n$

## 1.1 LR(0) automaton

Draw the LR(0) automaton for the grammar.

## 1.2 SLR parsing

Is the grammar SLR?
Justify your answer by presenting the SLR parsing table.

# 2 Tree simplification

The VSL compiler in the provided archive `ps3_skeleton.tgz` is extended with a function simplify tree in `tree.c`; this function is called from `main.c`, after the initial syntax tree construction. Implement the function so that it traverses the syntax tree, and makes the following modifications:

## 2.1 Eliminate nodes of purely syntactic value

Delete nodes which can only ever have 1 child and no meaningful data, and associate their child directly with their parent.

## 2.2  Flatten list structures

Delete internal nodes of list structures, leaving only a parent node with a list type, and all list items as its children. Print list items can be associated directly with the print statement.

## 2.3  Resolve constant expressions

Compute the value of subtrees representing arithmetic with constants, and replace them with their value.