TDT4205 Problem Set 4
Spring 2017

Answers are to be submitted through *It's Learning*, by Mar. 14^{th}, 20:00.
This problem set is graded, and counts for a total of 10% of the final mark

1 Theory

1.1 10%

Translate the following VSL program into a three-address code (TAC) representation. (Use the function's argument names as placeholders for its arguments' locations.)

```
FUNC main()
BEGIN
   RETURN axpy(2,3,4)
END

FUNC axpy(a,x,y)
BEGIN
    VAR r1, r2
    r1 := a * x
    r2 := r1 + y
    RETURN r2
END
```

1.2 10%

Suggest a stack frame layout for the `axpy` function on a machine which passes arguments via the run-time stack, and briefly explain the role of each element in your layout.
(You may use the x86 convention covered in lecture, but it is not required.)

1.3 5%

Show the state of the run-time stack at the point of execution where `axpy` is about to return.

2 Programming

Given the provided program archive ps4_skeleton.tgz,

2.1 15%

Implement the function find_globals in ir.c, to populate the global symbol table with

1. Global variables (5%)
2. Functions (10%)

2.2 45%

Implement the function bind_names in ir.c, to populate local symbol tables with

1. Parameters (15%)
2. Local variables (15%)

and link the entry pointers in its syntax tree nodes to their appropriate symbols. (15%)

2.3 10%

Extend bind_names to create a global table of strings.

2.4 5%

Implement the function destroy_symtab, to remove dynamically allocated symbol table data at the end of compilation.

Details on the function of these implementations are given in the accompanying recitation slide set.