CLP: Optimizations and SSA (WS 2018)

This exercise sheet will be discussed in the exercise sessions on December 18.

Exercise 1 Optimizations

```
1 // inputs: address 'ar' and integer 'n'
2 n0:
3   i ← 0
4   res ← 0
5   t ← ar + 4
6   s ← i * 4
7   goto n1
8 n1:
9   cond ← i < n
10  if cond then goto n2 else goto n6
11 n2:
12   t ← i * 4
13   s ← ar + 4
14   s ← s + t
15   ar_i ← load(s)
16   negative ← ar_i < 0
17   if negative then goto n3 else goto n4
18 n3:
19   res ← res - ar_i
20   goto n5
21 n4:
22   res ← res + ar_i
23   goto n5
24 n5:
25   i ← i + 1
26   goto n1
27 n6:
28   return res
```

a) Draw the control flow graph for the given code.

b) Compute the set of live variables (in + out) for each node the control flow graph.

c) Compute the set of available expressions (in + out) for each node in the control flow graph.

d) How can the code be optimized based on the results from b) and c)?

e) Explain why the code is not in SSA form.

f) Convert the code to SSA form.