

Model Checking | SS 2012 | 703521

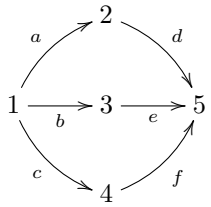
Week 14 | June 20, 2012

Homework

1. Encode a (linear) polynomial interpretation showing termination of the rule $f(f(x)) \to f(g(f(x))$ in NIA. Is the constraint satisfiable? What does MiniSmt reply?

   Hint: Use abstract interpretations $f_{\mathbb{N}}(x) = f_1 x + f_0$ and $g_{\mathbb{N}}(x) = g_1 x + g_0$.

2. Consider the weighted graph:

   Perform the *state elimination algorithm* eliminating nodes

   a) 1,2,3,4,5
   b) 2,3,4,1,5

   Conclude a strategy to obtain *small* intermediate graphs and hence small formulas.

3. Decide the satisfiability of the following quantifier-free formulas in the theory of arrays:

   (a) $a\langle i \lhd e\rangle[j] = e \ \wedge \ a[j] \neq e$
   (b) $i_1 = j \ \wedge \ a[j] = v_1 \ \wedge \ a\langle i_1 \lhd v_1\rangle\langle i_2 \lhd v_2\rangle[j] \neq a[j]$

4. Decide the satisfiability of the following formulas:

   (a) $a[k] = b[k] \ \wedge \ \forall i \ a[i] = b[i]$
   (b) $\forall i \, \forall j \ (\ell \leqslant i \leqslant j \leqslant u \ \to \ a[i] \leqslant a[j]) \ \wedge \ a[\ell] > a[u]$