

Abstract Interpretation: Exercises for day 5

[Note: you are welcome to solve these exercises in groups of 2]

February 6, 2015

1. Define the backward collecting semantics of the three counter machine
2. Abstract the backward collecting semantics to an analysis over $PC \rightarrow Interval \times Interval \times Interval$. In doing so, you should factor the definition into
 - backward versions of `var++`, `var--`, `var=0`, and `var<>0` over $Interval \times Interval \times Interval$ and
 - backward versions of the `=0`, `<>0`, `+1` and `-1` operations over $Interval$.
 - Do the backward operations look familiar?
3. Extend your implementation with the backward analysis.
4. Extend your implementation to a combined forward-backward analysis.

Bonus exercise

- Extend your analysis even further into an ‘abstract debugger’ for three counter machine programs.
 - What are your invariant and intermittent assertions?