

Assignment 6: Abstract Procedures

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November 3, 2011

1 Problem 2

1.1 Part 1

Iteration Nr.	Call	Return Value
1	$g(s(s(0)),0)$	$s(s(0))$
2	$g(0,s(0))$	0
3	$f(0)$	0

1.2 Part 2

The recursion relation is as follows:

$$g = \{\langle 0, 1 \rangle, \langle n, n-1 \rangle, \langle n, n \rangle\}$$
$$f = \{\langle n, n-2 \rangle\}$$

1.3 Part 3

For f there is no infinite chain in the recursion relation so it terminates. For g the function terminates if both inputs are different. The reason is that $(0,0)$ doesn't terminate on g and since the function subtracts one from every number on each iteration, the same numbers eventually get to $(0,0)$;

1.4 Part 4

The 'readable' version of the function g would be:

$$g(x, y) = \begin{cases} ? & \text{if } x = y \\ 4 * y + (x - y)/2 + 1 & \text{if } x > y \\ 4 * x + (y - x)/2 - 1 & \text{otherwise} \end{cases}$$

The function f simply halves its argument.