
HW 1 – Evaluation and Environments

CS 421 – Summer 2012

Revision 1.0

Assigned June 1, 2012

Due Jun 8, 2012, 11:59 PM

Extension 48 hours (20% penalty)

1 Change Log

1.0 Initial Release.

2 Turn-In Procedure

Your answers to the following questions are to be submitted electronically via the `handin` script as though an MP.

3 Objectives and Background

The purpose of this HW is to test your understanding of

- the order of evaluation of expressions in OCaml;
- the scope of variables, and the state of environments used during evaluation

Another purpose of HWs is to provide you with experience answering non-programming written questions of the kind you may experience on the midterms and final.

4 Problem

(15 pts) Below is a fragment of OCaml code, with various program points indicated by numbers with comments.

```
let x = 5;;
let a = x * 4;;
(* 1 *)
let g x = x + (3 * a);;
(* 2 *)
let a = g (g 3);;
(* 3 *)
let b =
  let f x y = g x + g (y + a) in
  (* 4 *)
  f x (g a);;
(* 5 *)
```

For each of program points 1, 2, 3, 4 and 5, please describe the environment in effect after evaluation has reached that point. You may assume that the evaluation begins in an empty environment, and that the environment is cumulative thereafter. The program points are supposed to indicate points at which all complete preceding declarations (including local ones) have been fully evaluated. In describing the environments 1 through 4, you may use set notation, as done in class, or you may use the update operator $+$. If you use set notation, no duplicate bindings should occur. The answer for program point 5 should be written out fully in set notation without the update operator or duplications.