
HW 1 – Evaluation and Environments

CS 421 – Fall 2013

Revision 1.1

Assigned August 27, 2013

Due September 3, 2013, 11:59 pm

Extension 48 hours (20% penalty)

1 Change Log

1.1 Corrected the handin due to Tuesday September 3, 2013.

1.0 Initial Release.

2 Turn-In Procedure

Using your favorite tool(s), you should put your solution in a file named `hw1.pdf` (the same name as this file has on the website). If you have problems generating a pdf, please seek help from the course staff. Your answers to the following questions are to be submitted electronically via the handin script as though an MP. This assignment is named `hw1`.

3 Objectives and Background

The purpose of this HW is to test your understanding of

- 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 Problems

1. (15 pts) Below is a fragment of OCaml code, with various program points indicated by numbers with comments.

```
3 * 7;;
(* 1 *)
let x = 22;;
let y = x / 2;;
(* 2 *)
let z =
  let x = 15 * y
  in
  (* 3 *)
  (x, y) ;;
(* 4 *)
let w = x + y
in
```

(★ 5 ★)

2 * w;;

(★ 6 ★)

let f x = y * x;;

(★ 7 ★)

let x = f y;;

(★ 8 ★)

For each of program points 1 through 8 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 in scope) have been fully evaluated. Answers should be written as a set of bindings (without the use of the update operator).