CMSC330 Spring 2011 Quiz #3 - SOLUTIONS

Name _____

Discussion Time (circle one): **9am 10am 11am 12pm 1pm 2pm**

Instructions

- Do not start this test until you are told to do so!
- You have 15 minutes for this quiz.
- This is a closed book exam. No notes or other aids are allowed.
- For partial credit, show all of your work and clearly indicate your answers.
- Write neatly. Credit cannot be given for illegible answers.

1. (12 pts) OCaml
   a. (4 pts) Give the type of the following OCaml expressions, or write "ERROR" if there is none. Here `map` refers to the standard curried list-processing function that was covered in class (and is also implemented in the `List` module).

      `fun x y -> x (y+1)` **Type = `(int ->'a) -> int -> 'a`**

      `map (fun x -> 2*x)` **Type = `int list -> int list`**

   b. (2 pts) Write an OCaml expression (not a declaration!) with the following type

      `(bool -> int) -> int` **Code =**

      ```
      fun f -> (f true) + 1
      ```

   c. (6 pts) Write a function `rmZeros` that, given a list of integers, returns the same list except with all occurrences of 0 removed. For example, `rmZeros [1;0;2;0]` should return `[1;2]`.

      ```
      let rec rmZeros = function
              [] -> []
        |     (h::t) ->
              if (h = 0)
              then rmZeros t
              else h::(rmZeros t)
      ```

2. (4 pts) Scope rules
   Consider the following OCaml declarations.

```
let x = 0;;
let f y = x;;
```

   The following questions refer to the expression `let x = 1 in f x`

   a. (2 pts) Under OCaml's usual static scoping rules, what is the value of the expression?

      0

   b. (2 pts) Now suppose OCaml uses dynamic scoping instead. What would the value of the expression be?

      1