CMSC 330, Fall 2017 Quiz 1

Name (as it appears on Gradescope) _____________________________________________

Discussion Time (circle one) 10am 11am 12pm 1pm 2pm 3pm
Discussion TA (circle one) Joseph Greg Justin Michael BT Daniel David Derek Cameron Eric Kesha Shriraj Pei-Jo Michael Bryan Kameron

Instructions
● Do not start this quiz until you are told to do so.
● You have 15 minutes for this quiz.
● This is a closed book quiz. No notes or other aids are allowed.
● For partial credit, show all your work and clearly indicate your answers.

1. (2 points each) What is the type of the following OCaml expressions?
   a. ["hello", 7, true]
   b. let foo x y = x :: y :: [1.0]
   c. let foo x y z = (x z) && (y z)

2. (2 points each) Write OCaml expressions of the following types without using type annotations.
   a. string * float list
   b. ('a -> int) -> 'a -> int
3. **(5 points)** Write an function `cap : 'a list -> 'a -> 'a list` which takes a list of values `lst` and a value `limit`, and returns a list of values with each value greater than `limit` replaced with `limit`. You may use `map`, defined below. (Hint: `<`, `<=`, `>`, `>` have the type `'a -> 'a -> bool`.)

```ocaml
let rec map f xs =  
  match xs with  
  | [] -> []  
  | x :: xs -> f x :: map f xs
```

```ocaml
cap [1; 4; 3; 2; 5] 3 = [1; 3; 3; 2; 3]  
cap [1; 2; 3] 0 = [0; 0; 0]  
cap [1.0; 2.0; 3.0] 6.0 = [1.0; 2.0; 3.0]
```

4. **(5 points)** Write a function `range : int -> int -> int list` which takes an int `start` and an int `end` and returns a list of consecutive integers in the range `[start, end)` (excluding end).

```ocaml
range 0 4 = [0; 1; 2; 3]  
range (-2) 2 = [-2; -1; 0; 1]  
range 4 4 = []  
range 4 2 = []
```