CMSC 330, Spring 2018 Quiz 1

Name  SOLUTION
Discussion Time (circle one)  10am  11am  12pm  1pm  2pm  3pm
Discussion TA (circle one)  BT  Daniel  Chris  Alex  Derek  Pei-Jo  Akbar  Justin L.  Tal  Shriraj  Cameron  Eric  Kesha  Kameron  Michael S.  Michael P.

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) Give the type of the following OCaml expressions. If there is a type error, explain it.
   
   (a) \([1;2] :: [3;4]\)
   error, the cons operator (\(\cdot\)) cannot be used to concatenate two lists. The type of the cons operator is \('a -> 'a list -> 'a list\"

   (b) let x = 5 in (true, x)
   bool * int

   (c) fun x y -> if x = y then x else y
   'a -> 'a -> 'a

   (d) fun f x y -> (f x) :: y
   ('a -> 'b) -> 'a -> 'b list -> 'b list

2. (2 points each) Give an OCaml expression of the following types.
   
   (a) int * (string list)
   (1,"foo")  (many answers possible)

   (b) int -> int -> int
   fun a b -> a + b  (many answers possible)

   (c) 'a -> 'b -> ('b * 'a) list
   fun a b -> [(b,a)]  (many answers possible)
3. (3 points each) What is the value of the following OCaml expressions?

(a) let rec f1 l a =  
    match l with 
    | [] -> a 
    | h::t -> f1 t (h::a) 
    in f1 [1;2;3] [7] 

    [3;2;1;7] 

(b) let rec f2 l =  
    match l with 
    | [] -> [] 
    | [h] -> [h*5] 
    | h::t -> (h*2)::(f2 t) 
    in f2 [1;2;3;4] 

    [2;4;6;20] 