CMSC 330 Fall 2016 Quiz #2

Name ____________________________

Discussion Time (circle one)  10am  11am  12noon  1pm  2pm  3pm

Discussion TA (circle one)  Alex   Austin   Ayman   Brian   Damien   Daniel K.
                          Daniel P. Greg   Tammy   Tim   Vitung   Will K.

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 of your work and clearly indicate your answers.

1. (4 points) Without using explicit type declarations, write OCaml expressions of type:

   a. 'a list -> 'a -> 'b -> 'a * 'b

   b. int -> string -> int * string -> bool

2. (4 points) Give the type of d in each of the following OCaml expressions:

   a. let d = ((1, 2), [3;0], [])

   b. let d = (fun x y z -> (x +. y) > z) 3.14
3. (5 points) Implement a function `insert_at_n ( 'a list -> 'a -> int -> 'a list)`, which will insert an element at position `n` in a list. If `n` is greater than the length of list, then insert the element to the end. The list's indices start at 0, and you can assume that `n` is a nonnegative integer. You can write helper functions.

   ```ocaml
   let rec insert_at_n lst ele n =
   ```

4. (7 points) Consider the following OCaml variant type definition for a binary tree:

   ```ocaml
   type binary_tree =
     Nil
   | Leaf of int
   | Node of int * binary_tree * binary_tree
   ```

   Write a function called `leaf_sum` that takes as input a `binary_tree` and returns the sum of all of the values of the leaves in the `binary_tree`. You can write helper functions.

   ```ocaml
   let rec leaf_sum tr =
   ```