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 postion `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.

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

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

```
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.

```
let rec leaf_sum tr =
```