

CMSC330 Fall 2010 Quiz #3

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.
- Answer essay questions concisely in 2-3 sentences. Longer answers are not needed.
- 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. (2 pts) Give the type of the following OCaml expression

`fun x y -> x (y+2)` **Type =**

b. (2 pts) Write an OCaml expression with the following type

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

c. (2 pts) Give the value of the following OCaml expression. If an error exists, describe the error.

`(fun x -> if (x > 0) then x+1) 1` **Value/Error =**

d. (6 pts) Using fold and an anonymous function, write a function *attendance* which when applied to a list *lst* of booleans, returns the number of elements of *lst* that are true. Example: *attendance* [true; false; false; true; true] = 3

let rec fold f a l = match l with [] -> a (h::t) -> fold f (f a h) t
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2. (8 pts) Context free grammars

a. (2 pts) Write a grammar for $a^x b^y$, where $x = y+3$ (i.e., exactly 3 more a's than b's)

b. (6 pts) Consider the following grammar

(where S = start symbol and terminals = [,], ;, ϵ):

$S \rightarrow [A] \quad | \quad \epsilon$

$A \rightarrow A ; S \quad | \quad \epsilon$

i. (3 pts) Present a derivation for the string $[\epsilon;[\epsilon;]]$

ii. (3 pts) Show the parse tree for your derivation