

CMSC 330, Spring 2018 Quiz 4

Name _____

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) Make all parentheses explicit in the following λ -expression:

$\lambda x. (\lambda a. a \lambda b. b b) x$

2. (4 points) Which of the following are alpha equivalent to $(\lambda x. x (\lambda x. y x)) y$

A $(\lambda x. x (\lambda x. z x)) z$

B $(\lambda z. z (\lambda a. y a)) y$

C $(\lambda z. z (\lambda x. y x)) y$

D $(\lambda w. w (\lambda x. y w)) y$

3. (6 points) If possible, completely reduce the following, otherwise write "Not Possible"

A $(\lambda x. x x) (\lambda y. y y)$

B $(\lambda a. b) x$

4. (8 points) Reduce the following λ -expression as much as possible. To receive partial credit, make sure to show alpha conversions and beta reductions.

$$(\lambda a. b a b) (\lambda c. \lambda b. b c) c$$