CMSC 330, Fall 2017 Quiz 4

Name ***(as it appears on Gradescope)*** _____
Discussion Time (circle one) 10am 11am 12pm 1pm 2pm 3pm
Discussion TA (circle one) Joseph Greg Justin Michael P. BT Daniel David Derek Cameron Eric Kesha Shriraj Pei-Jo Michael S. Bryan Kameron

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. *(4 points)* Using the rules given below, show: $(1 + 2) + 3 \Rightarrow 6$

$$\frac{}{n \Rightarrow n} \qquad \frac{e_1 \Rightarrow n_1 \quad e_2 \Rightarrow n_2 \quad n_3 \; is \; n_1 + n_2}{e_1 + e_2 \Rightarrow n_3}$$

$$\frac{\dfrac{1 \Rightarrow 1 \quad 2 \Rightarrow 2 \quad 3 \; is \; 1+2}{1+2 \Rightarrow 3} \qquad 3 \Rightarrow 3 \quad 6 \; is \; 3+3}{(1+2)+3 \Rightarrow 6}$$

2. *(8 points)* Using the rules given below, show: $A;\ let\ x = 1\ in\ let\ x = 2\ in\ x + x \Rightarrow 4$

$$\frac{}{A;\ n \Rightarrow n} \qquad \frac{A(x) = v}{A;\ x \Rightarrow v}$$

$$\frac{A;\ e_1 \Rightarrow v_1 \quad A, x : v_1;\ e_2 \Rightarrow v_2}{A;\ \textbf{let}\ x = e_1\ \textbf{in}\ e_2 \Rightarrow v_2} \qquad \frac{A;\ e_1 \Rightarrow n_1 \quad A;\ e_2 \Rightarrow n_2 \quad n_3 \; is \; n_1 + n_2}{A;\ e_1 + e_2 \Rightarrow n_3}$$

$$\frac{A;\ 1 \Rightarrow 1 \qquad \dfrac{A, x : 1;\ 2 \Rightarrow 2 \qquad \dfrac{\dfrac{A, x : 1, x : 2(x) = 2}{A, x : 1, x : 2;\ x \Rightarrow 2} \qquad \dfrac{A, x : 1, x : 2(x) = 2}{A, x : 1, x : 2;\ x \Rightarrow 2} \qquad 4 \; is \; 2 + 2}{x + x \Rightarrow 4}}{A, x : 1;\ let\ x = 2\ in\ x + x \Rightarrow 4}}{A;\ let\ x = 1\ in\ let\ x = 2\ in\ x + x \Rightarrow 4}$$

3. *(8 points)* Translate the following rules into English and describe the operation *myst* represents.

$$\text{Mystery(1):}\frac{A;\ e_1 \Rightarrow v_1 \qquad A;\ e_2 \Rightarrow v_2 \qquad v_1 = v_2}{A;\ myst\ e_1\ e_2 \Rightarrow true} \qquad \text{Mystery(2):}\frac{A;\ e_1 \Rightarrow v_1 \qquad A;\ e_2 \Rightarrow v_2 \qquad v_1 \neq v_2}{A;\ myst\ e_1\ e_2 \Rightarrow false}$$

- Mystery(1):
  Assuming e_1 evaluates to v_1 and e_2 evaluates to v_2 and v_1 equals v_2 then
  $myst\ e_1\ e_2$ evaluates to $true$
- Mystery(2):
  Assuming e_1 evaluates to v_1 and e_2 evaluates to v_2 and v_1 does not equal v_2 then
  $myst\ e_1\ e_2$ evaluates to $false$
- Operation: The *myst* represents an equality operation.