Recitation 18 Exercises

(1) let x = 1+2 in x+x

(2) let x = 0 in (fun y → x+y) 2

$\langle \{\}, \text{let } x = 1+2 \text{ in } x+x \rangle \Rightarrow 6$

$\quad \langle \{\}, 1+2 \rangle \Rightarrow 3$
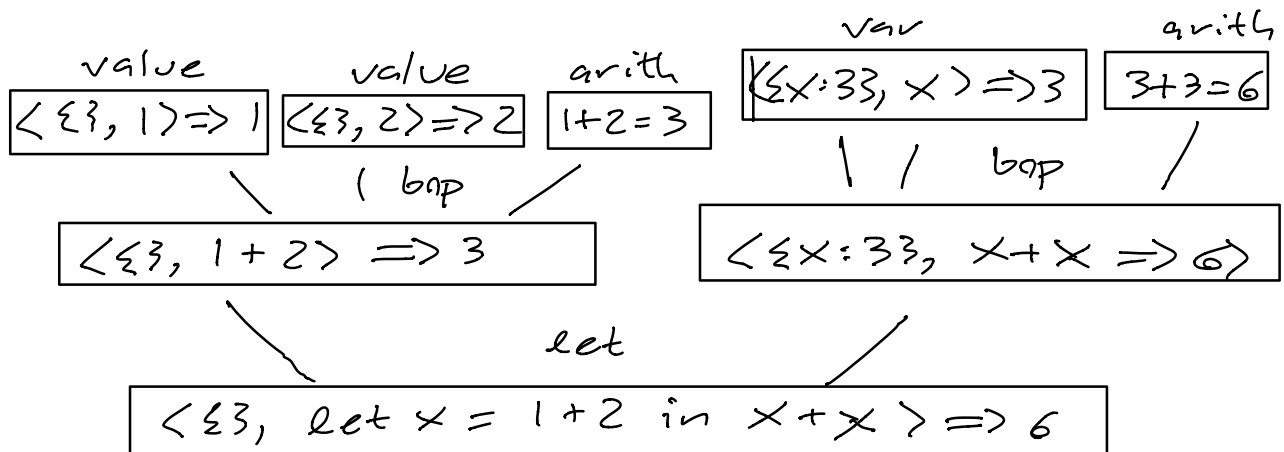
$\quad\quad \langle \{\}, 1 \rangle \Rightarrow 1$

$\quad\quad \langle \{\}, 2 \rangle = 2$

$\quad\quad \langle \{x:3\}, x+x \rangle \Rightarrow 6$

$\quad\quad\quad \langle \{x:3\}, x \rangle \Rightarrow 3$

$\quad\quad\quad \langle \{x:3\}, x \rangle \Rightarrow 3$

$e \rightarrow e_1 \rightarrow e_2 \rightarrow \cdots \rightarrow v$

value	value	arith
$\langle \{\}, 1 \rangle \Rightarrow 1$	$\langle \{\}, 2 \rangle \Rightarrow 2$	$1+2=3$

(bop

$\langle \{\}, 1+2 \rangle \Rightarrow 3$

var	arith
$\langle \{x:3\}, x \rangle \Rightarrow 3$	$3+3=6$

bop

$\langle \{x:3\}, x+x \Rightarrow 6 \rangle$

let

$\langle \{\}, \text{let } x = 1+2 \text{ in } x+x \rangle \Rightarrow 6$

$\dfrac{\cdots \quad\quad \cdots}{}$

$\langle \{\}, 1+2 \rangle \Rightarrow 3 \qquad\qquad \langle \{x:3\}, x+x \rangle \Rightarrow 6$

$\rule{8cm}{0.4pt}$ let rule

$\langle \{\}, \text{let } x = 1+2 \text{ in } x+x \rangle \Rightarrow 6$

(2) $\langle \{\}, \text{ let } x = 0 \text{ in } (\text{fun } y \to x+y)\ 2\ \rangle \Rightarrow 2$

$\quad \langle \{\}, 0 \rangle \Rightarrow 0$

$\quad \langle \{x:0\}, (\text{fun } y \to x+y)\ 2 \rangle \Rightarrow 2$

$\quad\quad \langle \{x:0\}, \text{ fun } y \to x+y \rangle \Rightarrow (|\text{ fun } y \to x+y, \{x:0\}|)$

$\quad\quad \langle \{x:0\}, 2 \rangle \Rightarrow 2$

$\quad\quad \langle \{x:0,\ y:2\}, x+y \rangle \Rightarrow 2$

$\quad\quad\quad \langle \{x:0, y:2\}, x \rangle \Rightarrow 0$

$\quad\quad\quad \langle \{x:0, y:2\}, y \rangle \Rightarrow 2$

$\quad\quad\quad 0 + 2 = 2$