Programming paradigms 1

Evaluation: lambda

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Outline

lambda

$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] =$ 'special form lambda'

Outline

(lambda (x) x)

$\mathsf{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

(lambda (x) x)

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((lambda (x) x) 10)

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Environment P_1 created.

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$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

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$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

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$\quad \texttt{x} \mapsto_{P_1} \texttt{10}$

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$\text{Eval}[\texttt{x}, P_1] = \texttt{10}$

Outline

((lambda (x) x) (+ 10 20))

$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})\ (\texttt{+}\ \texttt{10}\ \texttt{20})), \mathcal{P}_{\mathrm{G}}] = \ldots$

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$\quad\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

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$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})\ (\texttt{+}\ 10\ 20)), \mathcal{P}_{\mathrm{G}}] = \ldots$

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$\quad\quad \text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

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$\quad \texttt{x} \mapsto_{P_1} 30$

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$\quad \texttt{x} \mapsto_{P_1} 30$

$\text{Eval}[\texttt{x}, P_1] = 30$

Outline

((lambda (x) x) 10 20)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$$

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$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}),\ \texttt{x}] = \langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

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$$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$$

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$$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$$

$$\text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$$

$$\text{Apply}[\langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, 10,\ 20] = \ldots$$

((lambda (x) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

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$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}),\ \texttt{x}] = \langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

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$\text{Apply}[\langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, 10,\ 20] = \ldots$

Error: UDP applied with incorrect number of arguments.

Outline

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ \texttt{10}\ \texttt{20}), \mathcal{P}_{\mathrm{G}}] = \ldots$

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$$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ \texttt{10}\ \texttt{20}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

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((lambda (x y) x) 10 20)

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$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda (x y) x) 10 20)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$$

((lambda (x y) x) 10 20)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$$

$$\text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$$

((lambda (x y) x) 10 20)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle$$

$$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$$

$$\text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$$

$$\text{Apply}[\langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle, 10,\ 20] = \ldots$$

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

$\quad \text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

$\text{Apply}[\langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle, 10,\ 20] = \ldots$

$\quad$ Environment P_1 created.

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

$\quad \text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

$\text{Apply}[\langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle, 10,\ 20] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

$\quad \text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

$\text{Apply}[\langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, 10,\ 20] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{x} \mapsto_{P_1} 10$

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle$

$\text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

$\text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

$\text{Apply}[\langle(\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle, 10,\ 20] = \ldots$

Environment P_1 created.

$\mathcal{P}_{\mathrm{G}} \prec P_1$

$\texttt{x} \mapsto_{P_1} 10$

$\texttt{y} \mapsto_{P_1} 20$

((lambda (x y) x) 10 20)

$\text{Eval}[((\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x})\ 10\ 20), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{x}\ \texttt{y})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}\ \texttt{y}),\ \texttt{x}] = \langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[10, \mathcal{P}_{\mathrm{G}}] = 10$

$\quad \text{Eval}[20, \mathcal{P}_{\mathrm{G}}] = 20$

$\text{Apply}[\langle (\texttt{x}\ \texttt{y}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, 10,\ 20] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{x} \mapsto_{P_1} 10$

$\quad \texttt{y} \mapsto_{P_1} 20$

$\text{Eval}[\texttt{x}, P_1] = 10$

Outline

((lambda (x) x))

$\mathsf{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda (x) x))

$$\mathsf{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda (x) x))

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda (x) x))

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}),\ \texttt{x}] = \langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda (x) x))

$$\text{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{x}),\ \texttt{x}] = \langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\text{Apply}[\langle (\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$$

((lambda (x) x))

$\mathsf{Eval}[((\texttt{lambda}\ (\texttt{x})\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\mathsf{Eval}[(\texttt{lambda}\ (\texttt{x})\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] =$ 'special form lambda'

$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[$'special form lambda', $(\texttt{x}),\ \texttt{x}] = \langle(\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle$

$\mathsf{Apply}[\langle(\texttt{x}), \texttt{x}, \mathcal{P}_{\mathrm{G}}\rangle,] = \ldots$

Error: UDP applied with incorrect number of arguments.

Outline

(lambda () 10)

$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

(lambda () 10)

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

(lambda () 10)

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (), \ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$$

Outline

((lambda () 10))

$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda () 10))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda () 10))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda () 10))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda () 10))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\text{Apply}[\langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$$

((lambda () 10))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

((lambda () 10))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

((lambda () 10))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{10})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (), \ \texttt{10}] = \langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{10}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{10}, P_1] = \texttt{10}$

Outline

(lambda () +)

$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$

(lambda () +)

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

(lambda () +)

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$$

Outline

(lambda () (+))

$\mathsf{Eval}[(\texttt{lambda}\ ()\ (\texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

(lambda () (+))

$$\text{Eval}[(\texttt{lambda}\ ()\ (+)), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

(lambda () (+))

$$\text{Eval}[(\texttt{lambda}\ ()\ (+)), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ (+)] = \langle (), (+), \mathcal{P}_{\mathrm{G}} \rangle$$

Outline

((lambda () +))

$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda () +))

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda () +))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda () +))

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda () +))

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\mathsf{Apply}[\langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$$

((lambda () +))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

((lambda () +))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

((lambda () +))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{+}, P_1] = \ldots$

((lambda () +))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{+})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{+}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{+}] = \langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{+}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{+}, P_1] = \ldots$

$\text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

Outline

((lambda () x) 10)

$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda () x) 10)

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda () x) 10)

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda () x) 10)

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda () x) 10)

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\mathsf{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$$

((lambda () x) 10)

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\mathsf{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$$

$$\mathsf{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, \texttt{10}] = \ldots$$

((lambda () x) 10)

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle, \texttt{10}] = \ldots$

Error: UDP applied with incorrect number of arguments.

Outline

((lambda () x))

$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda () x))

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda () x))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda () x))

$$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda () x))

$$\mathsf{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\mathsf{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\mathsf{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$$

$$\mathsf{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$$

((lambda () x))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

((lambda () x))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

((lambda () x))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{x}, P_1] = \ldots$

((lambda () x))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{x}, P_1] = \ldots$

$\text{Eval}[\texttt{x}, \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda () x))

$\text{Eval}[((\texttt{lambda}\ ()\ \texttt{x})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ ()\ \texttt{x}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] =$ 'special form lambda'

$\quad \text{Apply}_{\mathcal{P}_{\mathrm{G}}}[$'special form lambda'$, (),\ \texttt{x}] = \langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle$

$\text{Apply}[\langle (), \texttt{x}, \mathcal{P}_{\mathrm{G}} \rangle,] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\text{Eval}[\texttt{x}, P_1] = \ldots$

$\text{Eval}[\texttt{x}, \mathcal{P}_{\mathrm{G}}] = \ldots$

Error: Symbol '$\texttt{x}$' does not have binding.

Outline

((lambda (f e) (f e)) + 10)

$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

((lambda (f e) (f e)) + 10)

$$\text{Eval}[(\texttt{(lambda (f e) (f e)) + 10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{(lambda (f e) (f e))}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

((lambda (f e) (f e)) + 10)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

((lambda (f e) (f e)) + 10)

$$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$$

((lambda (f e) (f e)) + 10)

$$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$$

$$\text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$$

$$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$$

$$\text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{(lambda (f e) (f e))} + \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[\texttt{(lambda (f e) (f e))}, \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, \texttt{(f e)}, \texttt{(f e)}] = \langle \texttt{(f e)}, \texttt{(f e)}, \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

((lambda (f e) (f e)) + 10)

$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{(lambda (f e) (f e)) + 10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda (f e) (f e)}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f e}),\ (\texttt{f e})] = \langle(\texttt{f e}), (\texttt{f e}), \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle(\texttt{f e}), (\texttt{f e}), \mathcal{P}_{\mathrm{G}}\rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{(lambda (f e) (f e)) + 10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda (f e) (f e)}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f e}),\ (\texttt{f e})] = \langle(\texttt{f e}), (\texttt{f e}), \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle(\texttt{f e}), (\texttt{f e}), \mathcal{P}_{\mathrm{G}}\rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

$\quad \texttt{e} \mapsto_{P_1} \texttt{10}$

((lambda (f e) (f e)) + 10)

$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

$\quad \texttt{e} \mapsto_{P_1} \texttt{10}$

$\text{Eval}[(\texttt{f}\ \texttt{e}), P_1] = \ldots$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

$\quad \texttt{e} \mapsto_{P_1} \texttt{10}$

$\text{Eval}[(\texttt{f}\ \texttt{e}), P_1] = \ldots$

$\quad \text{Eval}[\texttt{f}, P_1] = \text{'pr. proc. of sum.'}$

((lambda (f e) (f e)) + 10)

$\text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle(\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}}\rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

$\quad \texttt{e} \mapsto_{P_1} \texttt{10}$

$\text{Eval}[(\texttt{f}\ \texttt{e}), P_1] = \ldots$

$\quad \text{Eval}[\texttt{f}, P_1] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{e}, P_1] = \texttt{10}$

((lambda (f e) (f e)) + 10)

$\text{Eval}[((\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e}))\ \texttt{+}\ \texttt{10}), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad \text{Eval}[(\texttt{lambda}\ (\texttt{f}\ \texttt{e})\ (\texttt{f}\ \texttt{e})), \mathcal{P}_{\mathrm{G}}] = \ldots$

$\quad\quad \text{Eval}[\texttt{lambda}, \mathcal{P}_{\mathrm{G}}] = \text{'special form lambda'}$

$\text{Apply}_{\mathcal{P}_{\mathrm{G}}}[\text{'special form lambda'}, (\texttt{f}\ \texttt{e}),\ (\texttt{f}\ \texttt{e})] = \langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle$

$\quad \text{Eval}[\texttt{+}, \mathcal{P}_{\mathrm{G}}] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{10}, \mathcal{P}_{\mathrm{G}}] = \texttt{10}$

$\text{Apply}[\langle (\texttt{f}\ \texttt{e}), (\texttt{f}\ \texttt{e}), \mathcal{P}_{\mathrm{G}} \rangle, \text{'pr. proc. of sum.'},\ \texttt{10}] = \ldots$

$\quad$ Environment P_1 created.

$\quad \mathcal{P}_{\mathrm{G}} \prec P_1$

$\quad \texttt{f} \mapsto_{P_1} \text{'pr. proc. of sum.'}$

$\quad \texttt{e} \mapsto_{P_1} \texttt{10}$

$\text{Eval}[(\texttt{f}\ \texttt{e}), P_1] = \ldots$

$\quad \text{Eval}[\texttt{f}, P_1] = \text{'pr. proc. of sum.'}$

$\quad \text{Eval}[\texttt{e}, P_1] = \texttt{10}$

$\text{Apply}[\text{'pr. proc. of sum.'},\ \texttt{10}] = \texttt{10}$