

$$\begin{aligned}
& \text{reduce}(+,0) \circ \text{map}(\ast) \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.e} \quad \underbrace{\text{reduce}(+,0) \circ \text{part-reduce}(+,0)}_{\text{4.e}} \circ \text{map}(\ast) \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.e} \quad \text{reduce}(+,0) \circ \underbrace{\text{outerJoin}^n \circ \text{map}(\text{part-reduce}(+,0)) \circ \text{outerSplit}^n}_{\text{4.e}} \circ \underbrace{\text{map}(\ast)}_{\text{4.d}} \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \text{reduce}(+,0) \circ \text{outerJoin}^n \circ \text{map}(\text{part-reduce}(+,0)) \circ \underbrace{\text{outerSplit}^n \circ \text{outerJoin}^n \circ \text{map}(\text{map}(\ast)) \circ \text{outerSplit}^n}_{\text{4.g}} \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.h} \quad \text{reduce}(+,0) \circ \text{outerJoin}^n \circ \underbrace{\text{map}(\text{part-reduce}(+,0)) \circ \text{map}(\text{map}(\ast))}_{\text{4.h}} \circ \text{outerSplit}^n \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.e/5.b} \quad \text{reduce}(+,0) \circ \text{outerJoin}^n \circ \underbrace{\text{map}(\text{part-reduce}(+,0) \circ \text{map}(\ast))}_{\text{4.e/5.b}} \circ \underbrace{\text{outerSplit}^n}_{\text{5.a}} \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.h} \quad \text{reduce}(+,0) \circ \text{outerJoin}^n \circ \underbrace{\text{map}(\text{reduce-seq}(+,0) \circ \text{map-seq}(\ast))}_{\text{4.h}} \circ \text{outerSplit}^n \circ \text{zip}(\mathbf{x}, \mathbf{y}) \\
& \quad \text{4.h} \quad \text{reduce}(+,0) \circ \text{outerJoin}^n \circ \underbrace{\text{map}(\text{reduce-seq}(\lambda \text{ acc}, \langle a, b \rangle: \text{acc} + a \ast b, 0))}_{\text{4.h}} \circ \text{outerSplit}^n \circ \text{zip}(\mathbf{x}, \mathbf{y})
\end{aligned}$$