X5.4 Expressions should not have side-effects. But some programming languages have expressions with side-effects. Suppose the assignment

$x := x + ((x := x+1.\ \ y := y+2)$ **value** $x+y) + y$

is in a language with side effects. Translate these side-effect into main effects so that we can reason mathematically.

After trying the question, scroll down to the solution.

§ Perhaps, in this unknown language,

$x := x + ((x := x+1.\ y := y+2)$ **value** $x+y) + y$

means that x is assigned the initial value of x plus the value of $x+y$ after execution of $(x := x+1.\ y := y+2)$ plus the final value of y. If so, then it is translated to

(**new** $z := x.\ (x := x+1.\ y := y+2).\ x := z+x+y+y$)

Perhaps it means that x is assigned the initial value of x plus the value of $x+y$ after execution of $(x := x+1.\ y := y+2)$ plus the initial value of y. If so, then it is translated to

(**new** $z := x.$ **new** $w := y.\ (x := x+1.\ y := y+2).\ x := z+x+y+w$)