316 Here is a procedure applied to an argument.

$\langle x\colon int \to a := x.\ b := x\rangle\ (a+1)$

Suppose, by mistake, we replace both occurrences of $x$ in the body with the argument. What do we get? What should we get? (This mistake is known as "call-by-name".)

§ $\langle x\colon int \to a := x.\ b := x\rangle\ (a+1)$ as directed, replace both occurrences of $x$

$= \quad a := a+1.\ b := a+1$

$= \quad a' = a+1 \ \wedge\ b' = a+2$

On page 39, Exercise 110(k) says that it is a mistake to replace the $x$ after the composition. Here's what we should get.

$\langle x\colon int \to a := x.\ b := x\rangle\ (a+1)$ expand the two assignments

$= \quad \langle x\colon int \to a'=x \wedge b'=b.\ a'=a \wedge b'=x\rangle\ (a+1)$ definition of dependent composition

$= \quad \langle x\colon int \to \exists a'', b''\cdot\ a''=x \wedge b''=b \wedge a'=a'' \wedge b'=x\rangle\ (a+1)$

$= \quad \langle x\colon int \to a'=b'=x\rangle\ (a+1)$ apply

$= \quad a'=b'=a+1$

OR

$\langle x\colon int \to a := x.\ b := x\rangle\ (a+1)$ expand the last assignment

$= \quad \langle x\colon int \to a := x.\ a'=a \wedge b'=x\rangle\ (a+1)$ substitution law

$= \quad \langle x\colon int \to a'=x \wedge b'=x\rangle\ (a+1)$

$= \quad \langle x\colon int \to a'=b'=x\rangle\ (a+1)$ apply

$= \quad a'=b'=a+1$