297 Let x , y , and z be real variables. In what circumstances is the execution of

$x := y+z.\ \ z := x+y$

guaranteed to result in $z' = x+y$?

After trying the question, scroll down to the solution.

§ (the exact precondition for $z' = x+y$ to be refined by $(x := y+z.\ z := x+y)$)

$=$ $\forall x', y', z' \cdot\ z' = x+y \Leftarrow (x := y+z.\ z := x+y)$ expand final assignment

$=$ $\forall x', y', z' \cdot\ z' = x+y \Leftarrow (x := y+z.\ x' = x \wedge y' = y \wedge z' = x+y)$ substitution law

$=$ $\forall x', y', z' \cdot\ z' = x+y \Leftarrow x' = y+z \wedge y' = y \wedge z' = 2{\times}y + z$ one-point law

$=$ $2{\times}y + z = x+y$ arithmetic

$=$ $x = y+z$

This says that if $x = y+z$ initially, then execution of

$x := y+z.\ z := x+y$

is guaranteed to result in $z' = x+y$.