435 Let x and y be natural variables. Rewrite the following program as a program that does not use $\|$.

(a)
§ $x := x+1 \;\|\; \textbf{if } x=0 \textbf{ then } y := 1 \textbf{ else } ok \textbf{ fi}$ expand assignments and ok
$= \quad x' = x+1 \;\|\; \textbf{if } x=0 \textbf{ then } y'=1 \textbf{ else } y'=y \textbf{ fi}$ independent composition
$= \quad x' = x+1 \;\wedge\; \textbf{if } x=0 \textbf{ then } y'=1 \textbf{ else } y'=y \textbf{ fi}$ distribution
$= \quad \textbf{if } x=0 \textbf{ then } x' = x+1 \wedge y'=1 \textbf{ else } x' = x+1 \wedge y'=y \textbf{ fi}$ substitution law and identity
$= \quad \textbf{if } x=0 \textbf{ then } y := 1.\ x' = x+1 \wedge y'=y \textbf{ else } ok.\ x' = x+1 \wedge y'=y \textbf{ fi}$ assignment
$= \quad \textbf{if } x=0 \textbf{ then } y := 1.\ x := x+1 \textbf{ else } ok.\ x := x+1 \textbf{ fi}$ distribution
$= \quad \textbf{if } x=0 \textbf{ then } y := 1 \textbf{ else } ok \textbf{ fi}.\ x := x+1$

(b)
§ $\textbf{if } x>0 \textbf{ then } y := x-1 \textbf{ else } ok \textbf{ fi} \;\|\; \textbf{if } x=0 \textbf{ then } x := y+1 \textbf{ else } ok \textbf{ fi}$ asmts and ok
$= \quad \textbf{if } x>0 \textbf{ then } y' = x-1 \textbf{ else } y'=y \textbf{ fi} \;\|\; \textbf{if } x=0 \textbf{ then } x' = y+1 \textbf{ else } x'=x \textbf{ fi}$ indep. comp.
$= \quad \textbf{if } x>0 \textbf{ then } y' = x-1 \textbf{ else } y'=y \textbf{ fi} \;\wedge\; \textbf{if } x=0 \textbf{ then } x' = y+1 \textbf{ else } x'=x \textbf{ fi}$ x is natural
$= \quad \textbf{if } x>0 \textbf{ then } y' = x-1 \textbf{ else } y'=y \textbf{ fi} \;\wedge\; \textbf{if } \neg(x>0) \textbf{ then } x' = y+1 \textbf{ else } x'=x \textbf{ fi}$ case revers.
$= \quad \textbf{if } x>0 \textbf{ then } y' = x-1 \textbf{ else } y'=y \textbf{ fi} \;\wedge\; \textbf{if } x>0 \textbf{ then } x'=x \textbf{ else } x'=y+1 \textbf{ fi}$ case distributive
$= \quad \textbf{if } x>0 \textbf{ then } y' = x-1 \wedge x'=x \textbf{ else } x'=y+1 \wedge y'=y \textbf{ fi}$ assignment twice
$= \quad \textbf{if } x>0 \textbf{ then } y := x-1 \textbf{ else } x := y+1 \textbf{ fi}$