Q1

Group 4

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1 Question 1

1.1 Program statement

$S:$ if $(x > y)$ then $\{a := x, b := y\}$ else $\{a := y, b := x\}$

1.2 Post-condition

$R:$ $a > b$

1.3 Weakest pre-condition calculus

$wp(S, R):$ wp(if $(x > y)$ then $(a := x, b := y)$ else $(a := y, b := x), a > b) =$
(By Conditional Rule)
$(x > y) \Rightarrow wp((a := x, b := y), a > b) \wedge$
$\neg(x > y) \Rightarrow wp((a := y, b := x), a > b) =$
(By Assignment Rule)
$(x > y) \Rightarrow (x > y) \wedge not(x > y) \Rightarrow (y > x)$
(Simplify)
$(true \wedge not(x > y) \Rightarrow (y > x) =$
$(true) \wedge (y \neq x) =$
$(y \neq x)$

1.4 Pre-condition

For the program to satisfy: $R : a > b$, the weakest pre-condition is: $Q : x \neq y$