CSE 210A - HW 5 - Hoare Logic

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February 13, 2021

Exercise 1

$$\dfrac{\dfrac{\dfrac{}{\vdash \{x+1=y+1\}\ x := x+1\{x=y+1\}}\ [\text{assign}] \quad \dfrac{}{\vdash \{x=y+1\}\ y := y+1\{x=y\}}\ [\text{assign}]}{\vdash \{x+1=y+1\}x := x+1; y := y+1\{x=y\}}\ [\text{seq}]}{\text{A}}$$

$$\dfrac{\{x=y\} \longrightarrow \{x+1=y+1\} \qquad \text{A} \qquad \{x=y\} \longrightarrow \{x=y\}}{\vdash \{x=y\}x := x+1; y := y+1\{x=y\}}\ [\text{conseq}]$$

Exercise 2

$$\dfrac{\dfrac{\vdash \{\exists\ k.z = y + k \cdot x\} \wedge b \qquad \text{y := y - x} \qquad \vdash \{\exists\ k.z = y + k \cdot x\}}{\vdash \{\exists\ k.z = y + k \cdot x\}\ \text{while b do y := y - x}\ \{\exists\ k.z = y + k \cdot x\} \wedge \neg b}\ [\text{while}]}{\text{B}}$$

$$\dfrac{\{y=z\} \longrightarrow \{\exists\ k.z = y + k \cdot x\} \qquad \text{B} \qquad \{\exists\ k.z = y + k \cdot x\} \wedge \neg b \longrightarrow \{\exists\ k.z = y + k \cdot x\}}{\{y=z\}\ \text{while b do y := y - x}\ \{\exists\ k.z = y + k \cdot x\}}\ [\text{conseq}]$$