Ramya Krishnan

A20506653

<u>Redoing Midterm 5.a</u>

Consider the partial correctness triple

{x ≥ 1} y := (2x/x+1) {y ≥ 1}

Prove the triple is provable using the Hoare logic rules, i.e., ⊢ {x ≥ 1} y := (2x/x+1) {y ≥ 1}. Use a proof tree or Hilbert-style proof.

$$\frac{\{y \geq 1\}\ y := (2x \backslash x+1)\ \{y \geq 1\} \qquad x \geq 1 \Rightarrow (2x/x+1) \geq 1}{\{2x/x+1 \geq 1\}\ y := (2x \backslash x+1)\ \{y \geq 1\}}$$

$$\vdash \{x \geq 1\}\ y := (2x/x+1)\ \{y \geq 1\}$$

<u>Redoing Midterm 5.d</u>

Calculate wp(y := (2x/x+1), y ≥ 1)

wp(S,Q) = wlp(S,Q) ∧ D(S)

= wlp(y := (2x/x+1), y ≥ 1) ∧ D(y := (2x/x+1))

= [(2x/x+1)/y] (y ≥ 1) ∧ D(2x) ∧ D(x+1) ∧ x+1 ≠ 0

= (2x/x+1) ≥ 1 ∧ $\mathrm{D}(2) \wedge \mathrm{D}(\mathrm{x}) \wedge \mathrm{D}(\mathrm{x}) \wedge \mathrm{D}(1)$ ∧ x+1 ≠ 0

= (2x/x+1) ≥ 1 ∧ T ∧ T ∧ T ∧ T ∧ x+1 ≠ 0

= (2x/x+1) ≥ 1 ∧ x+1 ≠ 0

wp(y := (2x/x+1), y ≥ 1) = (2x/x+1) ≥ 1 ∧ x+1 ≠ 0