Algoritmos y estructuras de datos
Departamento de computación UBA

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3 Práctica 3 - Resoluciones

3.1 Ejercicio 1

(a) def(a+1) = def(a)

(b) def(a/b) = def(a) $\wedge$ (def(b) $\wedge_L$ b $\neq$ 0)

(c) def($\sqrt{\frac{a}{b}}$) = (def(a) $\wedge$ (def(b) $\wedge_L$ b $\neq$ 0)) $\wedge_L$ ((a > 0 $\wedge$ b > 0) $\vee$ (a < 0 $\wedge$ b < 0))

3.2 Ejercicio 2

a $\in \mathbb{R}$, b $\in \mathbb{R}$, i $\in \mathbb{Z}$, A: seq$\langle\mathbb{R}\rangle$

(a) wp(**a := a + 1, b := a/2**, b $\geq$ 0) = def(a + 1) $\wedge_L$ def(a/2) $\wedge_L$ $\frac{a+1}{2} \geq 0$

$$\text{wp} = \text{true} \wedge_L \text{true} \wedge_L a + 1 \geq 0$$

$$\text{wp} = a \geq -1$$

(c) wp(**a := A[i] + 1, a := b*b**, a $\geq$ 0) = def(A[i] + 1) $\wedge_L$ def(b * b) $\wedge_L$ $b^2 \geq 0$

$$\text{wp} = (\forall i : \mathbb{Z})(0 \leq i < |A|) \wedge_L \text{true} \wedge_L \text{true}$$

$$\text{wp} = (\forall i : \mathbb{Z})(0 \leq i < |A|)$$

3.3 Ejercicio 3

Q = $(\forall j : \mathbb{Z})(0 \leq j < |A| \rightarrow_L A[j] \geq 0)$, i $\in \mathbb{Z}$, A: seq$\langle\mathbb{R}\rangle$

(a) wp(**A[i] := 0**, Q) = wp(A := setAt(A, i, 0), Q)

$$\begin{aligned}\text{wp} &= ((\text{def(A)} \wedge \text{def(i)}) \wedge_L 0 \leq i \leq |A|) \wedge_L \text{def}(0) \wedge_L \\ &\quad (\forall j : \mathbb{Z})(0 \leq j < |\text{setAt(A, i, 0)}| \rightarrow_L \text{setAt(A, i, 0)[j]} \geq 0) \\ \text{wp} &= (0 \leq i \leq |A|) \wedge_L (\forall j : \mathbb{Z})(0 \leq j < |\text{A}| \wedge j \neq i) \rightarrow_L \text{setAt(A, i, 0)[j]} \geq 0)\end{aligned}$$

$$setAt(A, i, 0)[j] = \begin{cases} 0 & \text{si } i = j \\ A[j] & \text{si } i \neq j \end{cases}$$

Luego..

$$\begin{aligned}\text{wp} &= (0 \leq i \leq |A|) \wedge_L (\forall j : \mathbb{Z})(0 \leq j < |\text{A}| \wedge j \neq i \rightarrow_L \text{A[j]} \geq 0) \wedge 0 \geq 0 \\ \text{wp} &= (0 \leq i \leq |A|) \wedge_L (\forall j : \mathbb{Z})(0 \leq j < |\text{A}| \wedge j \neq i \rightarrow_L \text{A[j]} \geq 0)\end{aligned}$$

*Preguntar, decir que lo hice copiando las diapos de la practica del TM, pero que no entiendo porque el j $\neq$ i

(d) wp(**A[i] := 2 * A[i]**, Q) = wp(A := setAt(A, i, 2 * A[i]), Q)

$$\text{wp} = ((\text{def(A)} \wedge \text{def(i)}) \wedge_L 0 \leq i \leq |A|) \wedge_L \text{def(2*A[i])} \wedge_L (0 \leq i \leq |A|) \\ \wedge_L (\forall j : \mathbb{Z})(0 \leq j < |\text{setAt(A, i, 2* A[i])}| \rightarrow_L \text{setAt(A, i, 2*A[i])[j]} \geq 0)$$

$$\text{wp} = (0 \leq i \leq |A|) \wedge_L (\forall j : \mathbb{Z})(0 \leq j < |\text{A}| \wedge i \neq j \rightarrow_L \text{A[j]} \geq 0) \wedge A[i] \geq 0$$

*Hice lo mismo que en el anterior pero creo que no hace falta el j $\neq$ i

3.4 Ejercicio 4

None

3.5 Ejercicio 5

(b) S2 : a := a - s[0]

Q : $\{\text{a} = \sum_{j=1}^{i} s[j]\ \}$

wp(S2,Q) = def(a - s[0]) $\wedge_L$ (a - s[0] = $\sum_{j=1}^{i} s[j]$)

wp(S2,Q) = ($0 \leq i < |s|$) $\wedge_L$ (a = $\sum_{j=0}^{i} s[j]$)

*Preguntar si esta bien el def(a - s[0])