2do Parcial - Lógica y Resolución de Problemas

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Especificaciones y Cálculo Ecuacional

1 Pregunta (a) [2 puntos]

Formalizar los predicados:

1. $isprime_1(n) \equiv \varphi$
2. $divides_2(a, b) \equiv \psi$

1.1 $isprime_1(n) \equiv \varphi$

$isprime(n) \equiv n > 1 \wedge (\forall d :: n \,\%\, d = 0 \rightarrow d = 1 \vee d = n)$

1.2 $divides_2(a, b) \equiv \psi$

$divides_2(a, b) \equiv b \,\%\, a = 0$

2 Pregunta (b) [3 puntos]

2.1 1. $(\forall i : 0 \leq i < n : isprime_1(a(i)))$

Es correcta.

Modelo verdadero:

Δ
1
2
3

Constantes

n	2

a

	0	**1**
0	2	3

2.1.1 Demostración

> $[\![(\forall i : 0 \leq i < n : isprime_1(a(i)))]\!]$
>
> $[\![(\forall i :: 0 \leq i < n \rightarrow isprime_1(a(i)))]\!]$
>
> min
>
>> $[\![0 \leq i < n \rightarrow isprime_1(a(i))]\!]$ cuando $[i := 0]$
>>
>>> $[\![0 \leq i < n]\!]$
>>>
>>> $[\![((0 = i) \vee (0 < i)) \wedge (i < n)]\!]$
>>>
>>> min
>>>
>>>> $[\![((0 = i) \vee (0 < i))]\!]$
>>>>
>>>> max
>>>>
>>>>> $(0 = i)$
>>>>>
>>>>> 1
>>>>
>>>> 1
>>>
>>> $[\![(i < n)]\!]$
>>>
>>> 1
>>
>>> $[\![isprime_1(a(i))]\!]$
>>>
>>> $[\![a(i) > 1 \wedge (\forall d :: a(i) \,\%\, d = 0 \rightarrow d = 1 \vee d = a(i))]\!]$
>>>
>>> min
>>>
>>>> $a(i) > 1$
>>>>
>>>> 1
>>>
>>>> $[\![(\forall d :: a(i) \,\%\, d = 0 \rightarrow d = 1 \vee d = a(i))]\!]$
>>>>
>>>> min
>>>>
>>>>> $[\![a(i) \,\%\, d = 0 \rightarrow d = 1 \vee d = a(i)]\!]$ cuando $[d = 1]$
>>>>>
>>>>>> $[\![a(i) \,\%\, d = 0]\!]$
>>>>>>
>>>>>> 1
>>>>>
>>>>>> $[\![d = 1 \vee d = a(i)]\!]$
>>>>>>
>>>>>> max
>>>>>>
>>>>>>> $[\![d = 1]\!]$
>>>>>>>
>>>>>>> 1
>>>>>>
>>>>>> 1
>>>>>
>>>>> 1

$[\![a(i) \,\%\, d = 0 \to d = 1 \lor d = a(i)]\!]$ cuando $[d = 2]$

2 $[\![a(i) \,\%\, d = 0]\!]$

3 1

4 $[\![d = 1 \lor d = a(i)]\!]$

5 max

6 $[\![d = a(i)]\!]$

7 1

8 1

9 1

10 $[\![a(i) \,\%\, d = 0 \to d = 1 \lor d = a(i)]\!]$ cuando $[d = 3]$

11 $[\![a(i) \,\%\, d = 0]\!]$

12 0

13 1

14 1

15 1

16 1

17 $[\![0 \leq i < n \to isprime_1(a(i))]\!]$ cuando $[i := 1]$

18 $[\![0 \leq i < n]\!]$

$[\![((0 = i) \lor (0 < i)) \land (i < n)]\!]$

19 min

20 $[\![((0 = i) \lor (0 < i))]\!]$

21 max

22 $(0 < i)$

23 1

24 1

25 $[\![(i < n)]\!]$

26 1

1 $[\![isprime_1(a(i))]\!]$

2 $[\![a(i) > 1 \wedge (\forall d :: a(i) \,\%\, d = 0 \to d = 1 \vee d = a(i))]\!]$

3 min

4 $a(i) > 1$

5 1

6 $(\forall d :: a(i) \,\%\, d = 0 \to d = 1 \vee d = a(i))$

7 min

8 $[\![a(i) \,\%\, d = 0 \to d = 1 \vee d = a(i)]\!]$ cuando $[d = 1]$

9 $[\![a(i) \,\%\, d = 0]\!]$

10 1

11 $[\![d = 1 \vee d = a(i)]\!]$

12 max

13 $[\![d = 1]\!]$

14 1

15 1

16 1

17 $[\![a(i) \,\%\, d = 0 \to d = 1 \vee d = a(i)]\!]$ cuando $[d = 2]$

18 $[\![a(i) \,\%\, d = 0]\!]$

19 0

20 1

21 $[\![a(i) \,\%\, d = 0 \to d = 1 \vee d = a(i)]\!]$ cuando $[d = 3]$

22 $[\![a(i) \,\%\, d = 0]\!]$

23 1

24 $[\![d = 1 \vee d = a(i)]\!]$

25 max

26 $[\![d = a(i)]\!]$

27 1

28 1

29 1

30 1

31 1

32 1

1

$[\![(\forall i : 0 \leq i < n : isprime_1(a(i)))]\!] = 1$

2.2 **2.** $(\forall i : 0 \leq i < n : divides_2(1, a(i)) \wedge divides_2(a(i), a(i))$

Es incorrecta.

Modelo que debería arrojar falso, pero devuelve verdadero.

Δ
1
2
4

Constantes

n	1

a

	0
0	4

2.2.1 Demostración

$\llbracket(\forall i : 0 \leq i < n : divides_2(1, a(i)) \wedge divides_2(a(i), a(i))\rrbracket$

2 $\llbracket(\forall i :: 0 \leq i < n \rightarrow divides_2(1, a(i)) \wedge divides_2(a(i), a(i))\rrbracket$

3 min

4 $\quad \llbracket 0 \leq i < n \rightarrow divides_2(1, a(i)) \wedge divides_2(a(i), a(i))\rrbracket$ cuando $[i := 0]$

5 $\quad\quad \llbracket 0 \leq i < n\rrbracket$

$\quad\quad\quad \llbracket((0 = i) \vee (0 < i)) \wedge (i < n)\rrbracket$

6 $\quad\quad min$

7 $\quad\quad\quad \llbracket((0 = i) \vee (0 < i))\rrbracket$

8 $\quad\quad\quad max$

9 $\quad\quad\quad\quad (0 = i)$

10 $\quad\quad\quad\quad 1$

11 $\quad\quad\quad 1$

12 $\quad\quad\quad \llbracket(i < n)\rrbracket$

13 $\quad\quad\quad 1$

14 $\quad\quad 1$

15 $\quad\quad \llbracket divides_2(1, a(i)) \wedge divides_2(a(i), a(i))\rrbracket$

16 $\quad\quad min$

17 $\quad\quad\quad \llbracket divides_2(1, a(i))\rrbracket$

18 $\quad\quad\quad \llbracket a(i)\%1 = 0\rrbracket$

19 $\quad\quad\quad 1$

20 $\quad\quad\quad \llbracket divides_2(a(i), a(i))\rrbracket$

21 $\quad\quad\quad \llbracket a(i)\%a(i) = 0\rrbracket$

22 $\quad\quad\quad 1$

23 $\quad\quad 1$

24 $\quad 1$

1

$\llbracket(\forall i : 0 \leq i < n : divides_2(1, a(i)) \wedge divides_2(a(i), a(i))\rrbracket = 1$

3 Pregunta (c)

3.1 1.

$(\forall p : ambassador_1(p) : sentto_2(p, france)) \equiv (\forall p : \neg sentto_2(p, france) : \neg ambassador_1(p))$

1. $(\forall p : ambassador_1(p) : sentto_2(p, france))$
2. $(\forall p :: ambassador_1(p) \rightarrow sentto_2(p, france))$ (término)
3. $(\forall p :: \neg sentto_2(p, france) \rightarrow \neg ambassador_1(p))$ (Teorema 31 de la práctica)
4. $(\forall p : \neg sentto_2(p, france) : \neg ambassador_1(p))$ (término)

$(\exists_p : ambassador_1(p) : sentto_2(p, france)) \equiv (\exists p : sentto_2(p, france) : ambassador_1(p))$
1.$(\exists_p : ambassador_1(p) : sentto_2(p, france))$
2.$(\exists_p :: ambassador_1(p) \wedge sentto_2(p, france))$ (Teorema C de lapractica)
3.$(\exists_p :: sentto_2(p, france) \wedge ambassador_1(p))$ (Teorema 13 de la practica)
4.$(\exists_p : sentto_2(p, france) : ambassador_1(p))$ (Teorema 13 de la practica)