Modelos de Computación.
Práctica 4.

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Resumen

Prácticas con el simulador URM.

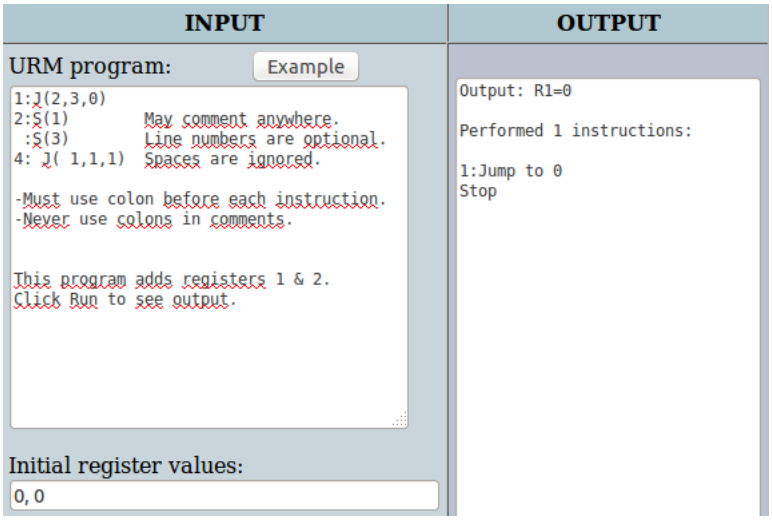
1. Ejercicio 1

Computaciones para el programa

```
J(2,3,0)
S(1)
S(3)
J(1,1,1)
```

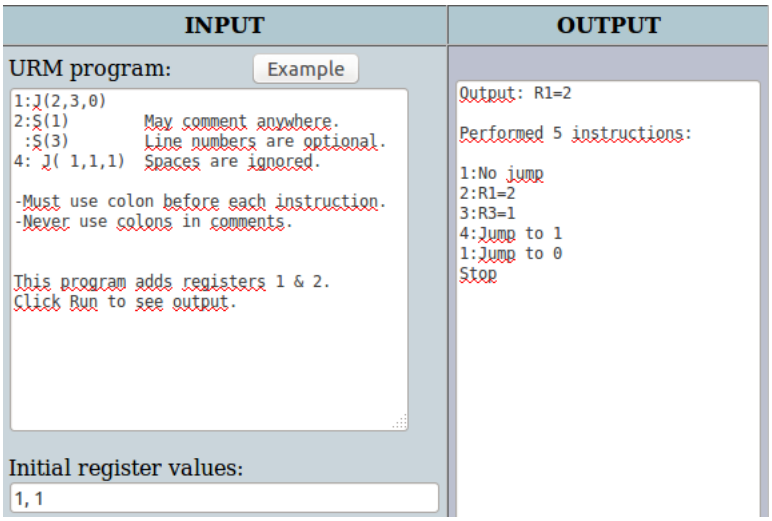
1.1. Computación para la entrada $R1 = 0, R2 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0 >) \sim (0, < R1 = 0, R2 = 0, R3 = 0 >)$$



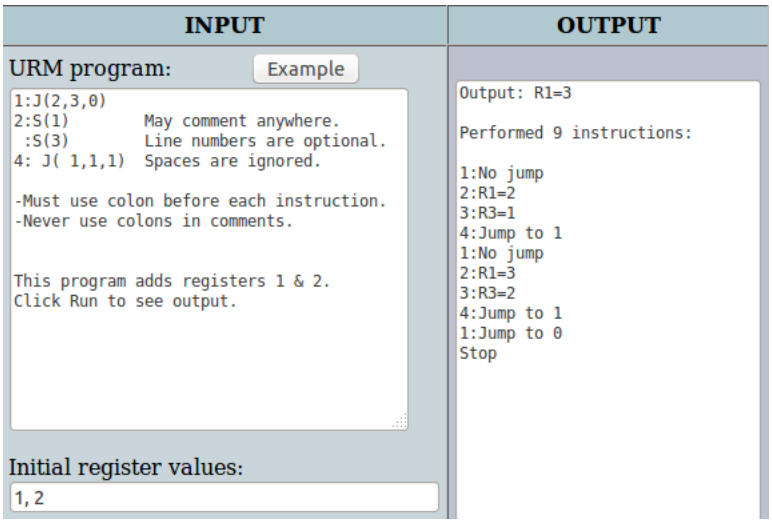
1.2. Computación para la entrada $R1 = 1, R2 = 1$

$$(1, < R1 = 1, R2 = 1, R3 = 0 >) \sim (2, < R1 = 1, R2 = 1, R3 = 0 >) \sim (3, < R1 = 2, R2 = 1, R3 = 0 >) \sim (4, < R1 = 2, R2 = 1, R3 = 1 >) \sim (1, < R1 = 2, R2 = 1, R3 = 1 >) \sim (0, < R1 = 2, R2 = 1, R3 = 1 >)$$



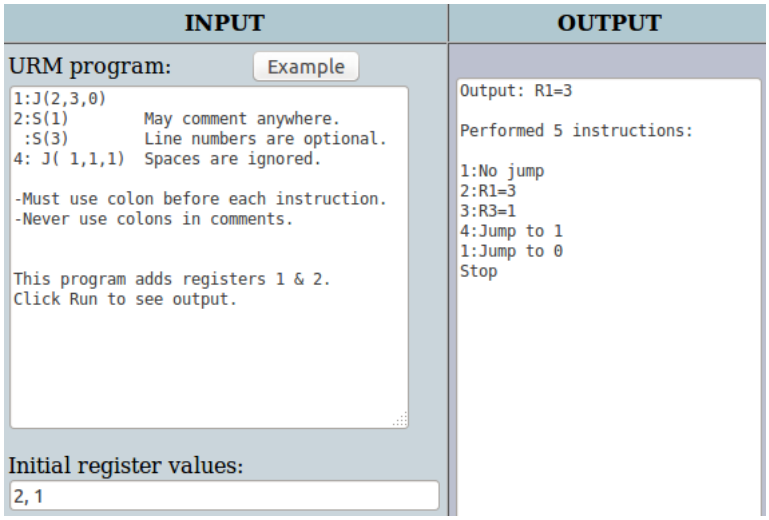
1.3. Computación para la entrada $R1 = 1, R2 = 2$

$$(1, < R1 = 1, R2 = 2, R3 = 0 >) \sim (2, < R1 = 1, R2 = 2, R3 = 0 >) \sim (3, < R1 = 2, R2 = 2, R3 = 0 >) \sim (4, < R1 = 2, R2 = 2, R3 = 1 >) \sim (1, < R1 = 2, R2 = 2, R3 = 1 >) \sim (2, < R1 = 2, R2 = 2, R3 = 1 >) \sim (3, < R1 = 3, R2 = 2, R3 = 1 >) \sim (4, < R1 = 3, R2 = 2, R3 = 2 >) \sim (1, < R1 = 3, R2 = 2, R3 = 2 >) \sim (0, < R1 = 3, R2 = 2, R3 = 2 >)$$



1.4. Computación para la entrada $R1 = 2, R2 = 1$

$$(1, < R1 = 2, R2 = 1, R3 = 0 >) \sim (2, < R1 = 2, R2 = 1, R3 = 0 >) \sim (3, < R1 = 3, R2 = 1, R3 = 0 >) \sim (4, < R1 = 3, R2 = 1, R3 = 1 >) \sim (1, < R1 = 3, R2 = 1, R3 = 1 >) \sim (0, < R1 = 3, R2 = 1, R3 = 1 >)$$



2. Ejercicio 2

El programa

```
J(1,2,3)
J(1,1,4)
S(2)
T(2,1)
```

calcula la función

$$f(x) = \begin{cases} x & \text{si } x > 0 \\ 1 & \text{en otro caso} \end{cases}$$

3. Ejercicio 3

Código propuesto para el programa "bloque de transferencia":

```
T(1,2)
J(1,1,1)
```

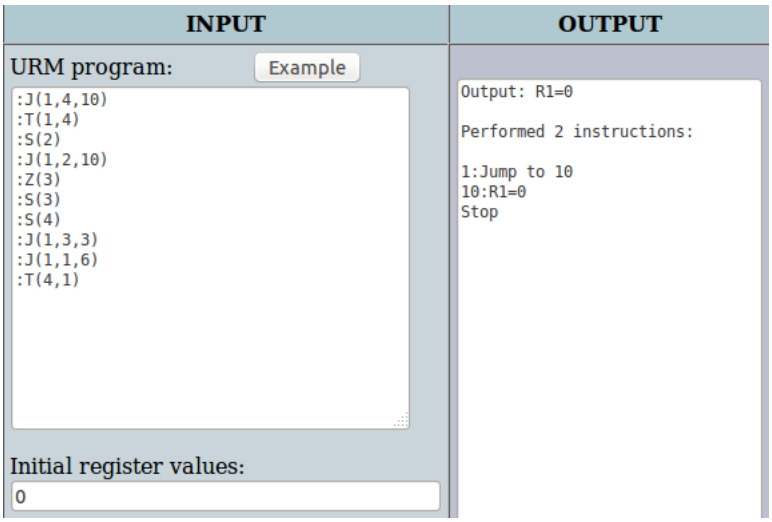
4. Ejercicio 4

Computaciones para el programa

```
J(1,4,10)
T(1,4)
S(2)
J(1,2,10)
Z(3)
S(3)
S(4)
J(1,3,3)
J(1,1,6)
T(4,1)
```

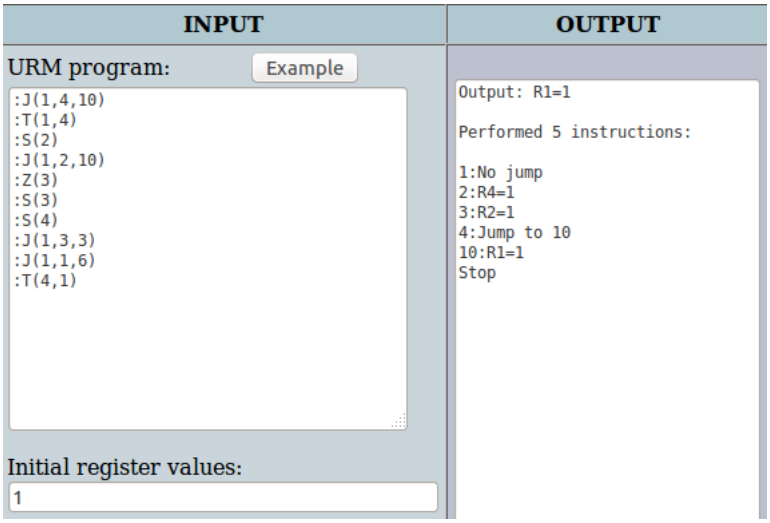
4.1. Computación para la entrada $R1 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >) \sim (10, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >) \sim (11, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >)$$



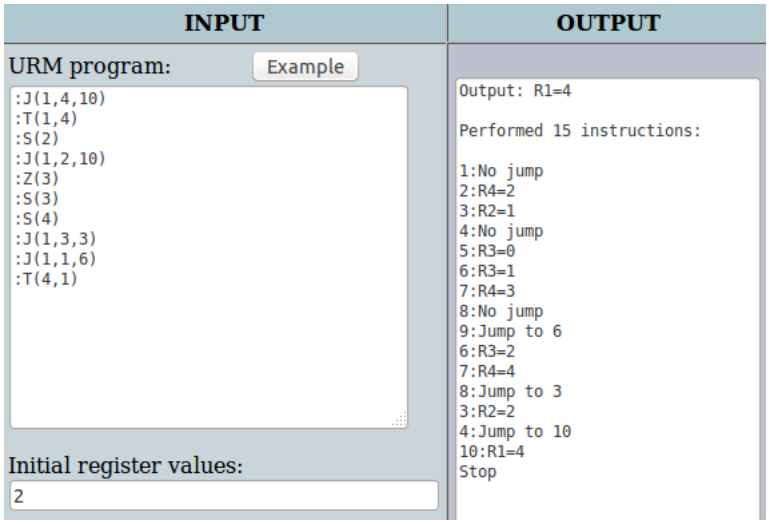
4.2. Computación para la entrada $R1 = 1$

$$(1, < R1 = 1, R2 = 0, R3 = 0, R4 = 0 >) \sim (2, < R1 = 1, R2 = 0, R3 = 0, R4 = 0 >) \sim (3, < R1 = 1, R2 = 0, R3 = 0, R4 = 1 >) \sim (4, < R1 = 1, R2 = 1, R3 = 0, R4 = 1 >) \sim (10, < R1 = 1, R2 = 1, R3 = 0, R4 = 1 >) \sim (11, < R1 = 1, R2 = 1, R3 = 0, R4 = 1 >)$$



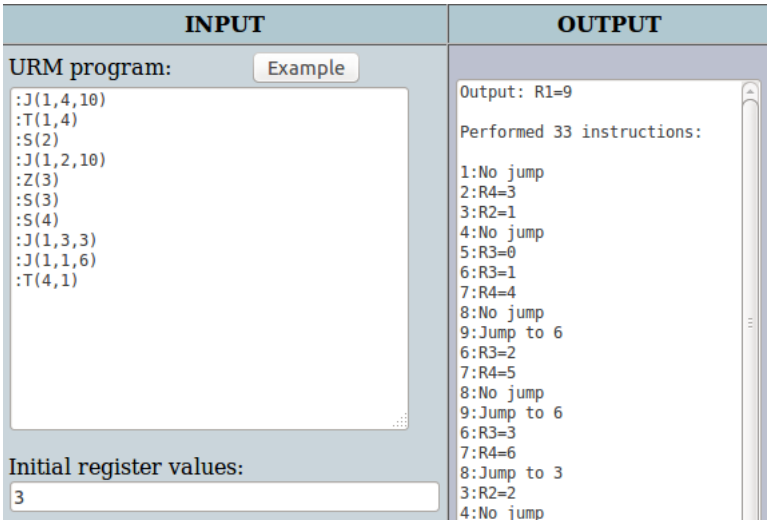
4.3. Computación para la entrada $R1 = 2$

$$(1, < R1 = 2, R2 = 0, R3 = 0, R4 = 0 >) \sim (2, < R1 = 2, R2 = 0, R3 = 0, R4 = 0 >) \sim$$
$$(3, < R1 = 2, R2 = 0, R3 = 0, R4 = 2 >) \sim (4, < R1 = 2, R2 = 1, R3 = 0, R4 = 2 >) \sim$$
$$(5, < R1 = 2, R2 = 1, R3 = 0, R4 = 2 >) \sim (6, < R1 = 2, R2 = 1, R3 = 0, R4 = 2 >) \sim$$
$$(7, < R1 = 2, R2 = 1, R3 = 1, R4 = 2 >) \sim (8, < R1 = 2, R2 = 1, R3 = 1, R4 = 3 >) \sim$$
$$(9, < R1 = 2, R2 = 1, R3 = 1, R4 = 3 >) \sim (6, < R1 = 2, R2 = 1, R3 = 1, R4 = 3 >) \sim$$
$$(7, < R1 = 2, R2 = 1, R3 = 2, R4 = 3 >) \sim (8, < R1 = 2, R2 = 1, R3 = 2, R4 = 4 >) \sim$$
$$(3, < R1 = 2, R2 = 1, R3 = 2, R4 = 4 >) \sim (4, < R1 = 2, R2 = 2, R3 = 2, R4 = 4 >) \sim$$
$$(10, < R1 = 2, R2 = 2, R3 = 2, R4 = 4 >) \sim (11, < R1 = 4, R2 = 2, R3 = 2, R4 = 4 >)$$



4.4. Computación para la entrada $R1 = 3$

$$(1, < R1 = 3, R2 = 0, R3 = 0, R4 = 0 >) \sim (2, < R1 = 3, R2 = 0, R3 = 0, R4 = 0 >) \sim$$
$$(3, < R1 = 3, R2 = 0, R3 = 0, R4 = 3 >) \sim (4, < R1 = 3, R2 = 1, R3 = 0, R4 = 3 >) \sim$$
$$(5, < R1 = 3, R2 = 1, R3 = 0, R4 = 3 >) \sim (6, < R1 = 3, R2 = 1, R3 = 0, R4 = 3 >) \sim$$
$$(7, < R1 = 3, R2 = 1, R3 = 1, R4 = 3 >) \sim (8, < R1 = 3, R2 = 1, R3 = 1, R4 = 4 >) \sim$$
$$(9, < R1 = 3, R2 = 1, R3 = 1, R4 = 4 >) \sim (6, < R1 = 3, R2 = 1, R3 = 1, R4 = 4 >) \sim$$
$$(7, < R1 = 3, R2 = 1, R3 = 2, R4 = 4 >) \sim (8, < R1 = 3, R2 = 1, R3 = 2, R4 = 5 >) \sim$$
$$(9, < R1 = 3, R2 = 1, R3 = 2, R4 = 5 >) \sim (6, < R1 = 3, R2 = 1, R3 = 2, R4 = 5 >) \sim$$
$$(7, < R1 = 3, R2 = 1, R3 = 3, R4 = 5 >) \sim (8, < R1 = 3, R2 = 1, R3 = 3, R4 = 6 >) \sim$$
$$(3, < R1 = 3, R2 = 1, R3 = 3, R4 = 6 >) \sim (4, < R1 = 3, R2 = 2, R3 = 3, R4 = 6 >) \sim$$
$$(5, < R1 = 3, R2 = 2, R3 = 3, R4 = 6 >) \sim (6, < R1 = 3, R2 = 2, R3 = 0, R4 = 6 >) \sim$$
$$(7, < R1 = 3, R2 = 2, R3 = 1, R4 = 6 >) \sim (8, < R1 = 3, R2 = 2, R3 = 1, R4 = 7 >) \sim$$
$$(9, < R1 = 3, R2 = 2, R3 = 1, R4 = 7 >) \sim (6, < R1 = 3, R2 = 2, R3 = 1, R4 = 7 >) \sim$$
$$(7, < R1 = 3, R2 = 2, R3 = 2, R4 = 7 >) \sim (8, < R1 = 3, R2 = 2, R3 = 2, R4 = 8 >) \sim$$
$$(9, < R1 = 3, R2 = 2, R3 = 2, R4 = 8 >) \sim (6, < R1 = 3, R2 = 2, R3 = 2, R4 = 8 >) \sim$$
$$(7, < R1 = 3, R2 = 2, R3 = 3, R4 = 8 >) \sim (8, < R1 = 3, R2 = 2, R3 = 3, R4 = 9 >) \sim$$
$$(3, < R1 = 3, R2 = 2, R3 = 3, R4 = 9 >) \sim (4, < R1 = 3, R2 = 3, R3 = 3, R4 = 9 >) \sim$$
$$(10, < R1 = 3, R2 = 3, R3 = 3, R4 = 9 >) \sim (11, < R1 = 9, R2 = 3, R3 = 3, R4 = 9 >)$$



4.5. Función calculada

El programa calcula la función

$$f(x) = x * x$$

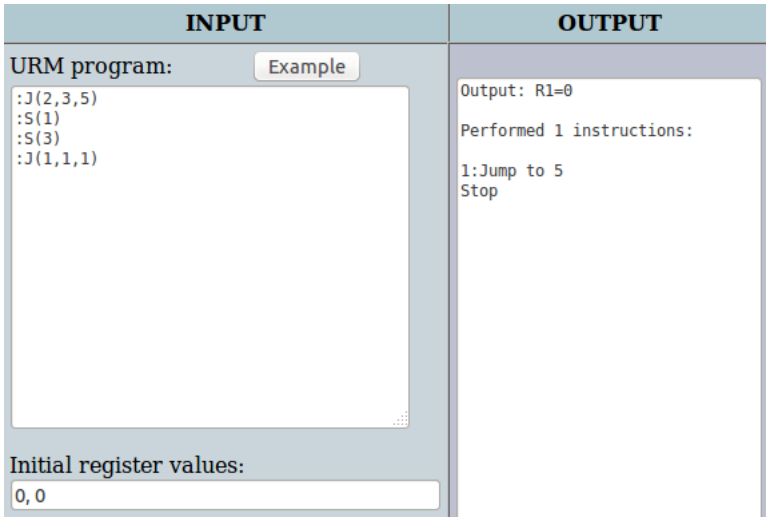
5. Ejercicio 5

Computaciones para el programa

```
J(2,3,5)
S(1)
S(3)
J(1,1,1)
```

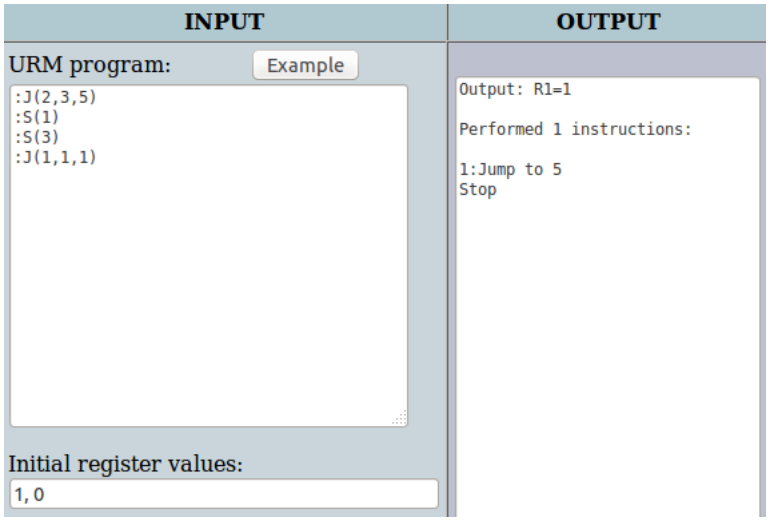
5.1. Computación para la entrada $R1 = 0$, $R2 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0 >) \sim (5, < R1 = 0, R2 = 0, R3 = 0 >)$$



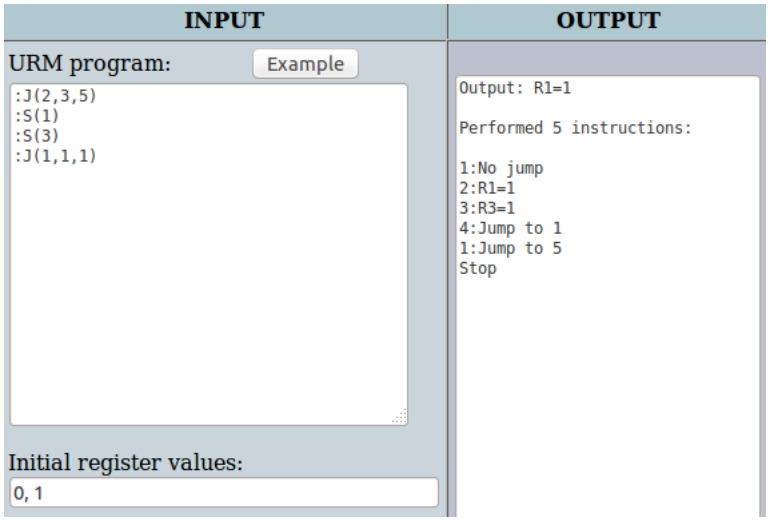
5.2. Computación para la entrada $R1 = 1$, $R2 = 0$

$$(1, < R1 = 1, R2 = 0, R3 = 0 >) \sim (5, < R1 = 1, R2 = 0, R3 = 0 >)$$



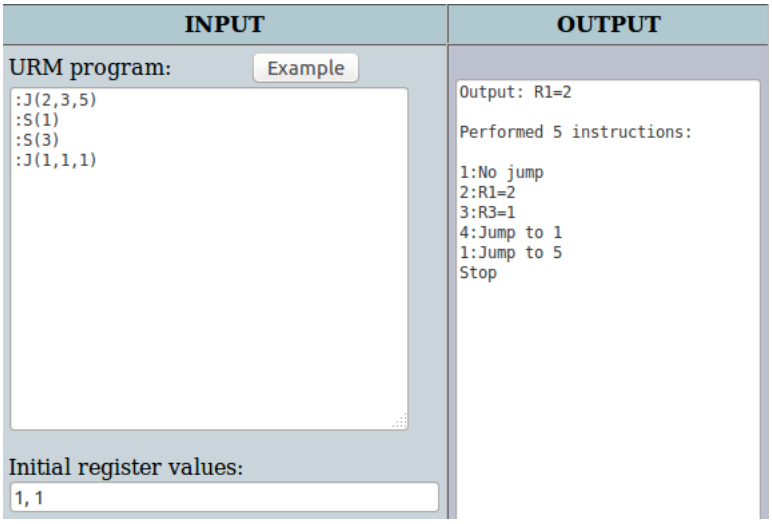
5.3. Computación para la entrada $R1 = 0$, $R2 = 1$

$$(1, < R1 = 0, R2 = 1, R3 = 0 >) \sim (2, < R1 = 0, R2 = 1, R3 = 0 >) \sim (3, < R1 = 1, R2 = 1, R3 = 0 >) \sim$$
$$(4, < R1 = 1, R2 = 1, R3 = 1 >) \sim (1, < R1 = 1, R2 = 1, R3 = 1 >) \sim (5, < R1 = 1, R2 = 1, R3 = 1 >)$$



5.4. Computación para la entrada $R1 = 1$, $R2 = 1$

$$(1, < R1 = 1, R2 = 1, R3 = 0 >) \sim (2, < R1 = 1, R2 = 1, R3 = 0 >) \sim (3, < R1 = 2, R2 = 1, R3 = 0 >) \sim$$
$$(4, < R1 = 2, R2 = 1, R3 = 1 >) \sim (1, < R1 = 2, R2 = 1, R3 = 1 >) \sim (5, < R1 = 2, R2 = 1, R3 = 1 >)$$



5.5. Función calculada

El programa calcula la función

$$f(x_1, x_2) = x_1 + x_2$$

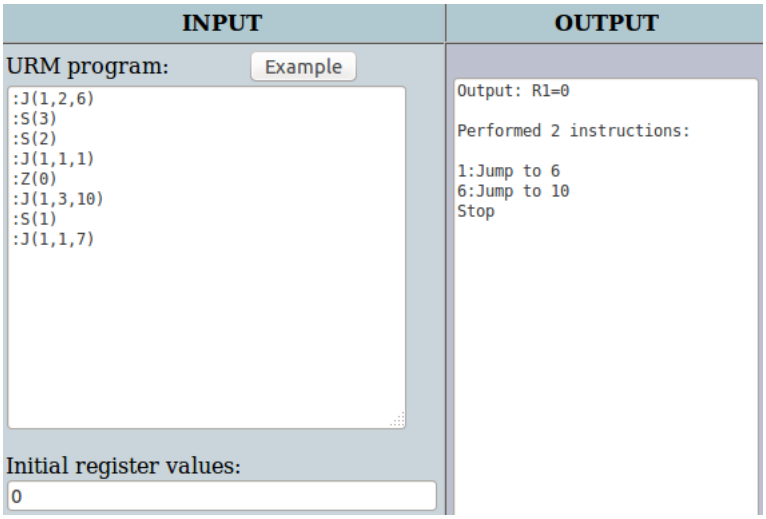
6. Ejercicio 6

Computaciones para el programa

```
J(1,2,6)
S(3)
S(2)
J(1,1,1)
Z(0)
J(1,3,10)
S(1)
J(1,1,7)
```

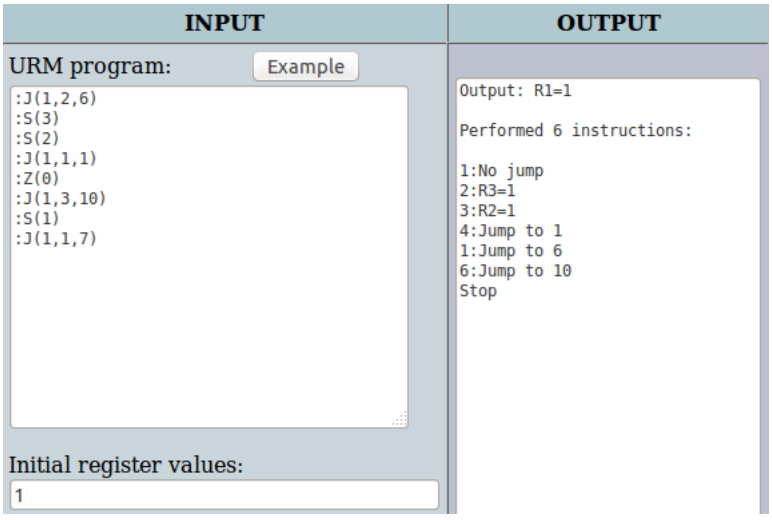
6.1. Computación para la entrada $R1 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0 >) \sim (6, < R1 = 0, R2 = 0, R3 = 0 >) \sim (9, < R1 = 0, R2 = 0, R3 = 0 >)$$



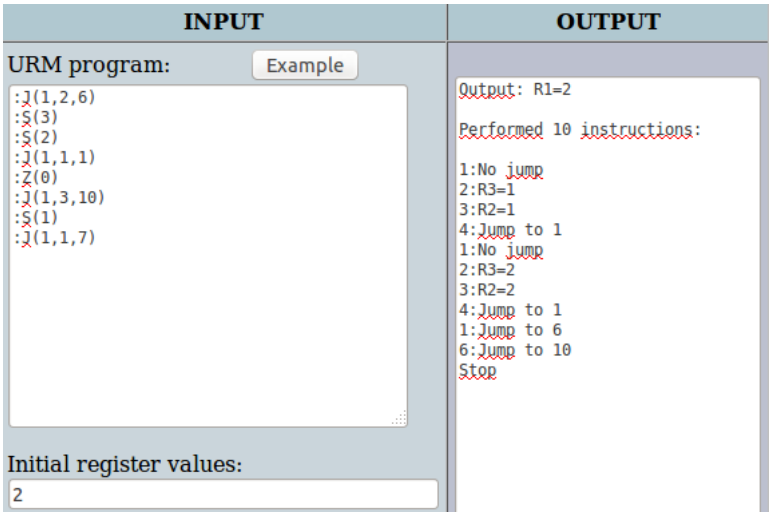
6.2. Computación para la entrada $R1 = 1$

$$(1, < R1 = 1, R2 = 0, R3 = 0 >) \sim (2, < R1 = 1, R2 = 0, R3 = 0 >) \sim (3, < R1 = 1, R2 = 0, R3 = 1 >) \sim$$
$$(4, < R1 = 1, R2 = 1, R3 = 1 >) \sim (1, < R1 = 1, R2 = 1, R3 = 1 >) \sim (6, < R1 = 1, R2 = 1, R3 = 1 >) \sim$$
$$(9, < R1 = 1, R2 = 1, R3 = 1 >)$$



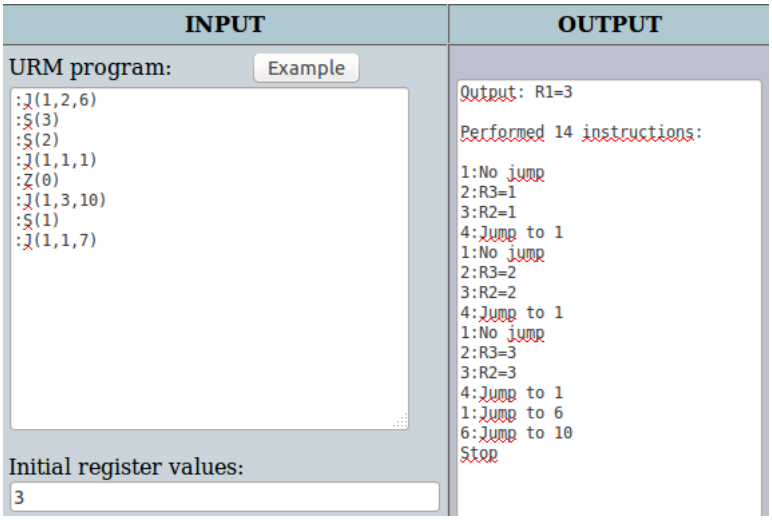
6.3. COmputación para la entrada $R1 = 2$

$$(1, < R1 = 2, R2 = 0, R3 = 0 >) \sim (2, < R1 = 2, R2 = 0, R3 = 0 >) \sim (3, < R1 = 2, R2 = 0, R3 = 1 >) \sim$$
$$(4, < R1 = 2, R2 = 1, R3 = 1 >) \sim (1, < R1 = 2, R2 = 1, R3 = 1 >) \sim (2, < R1 = 2, R2 = 1, R3 = 1 >) \sim$$
$$(3, < R1 = 2, R2 = 1, R3 = 2 >) \sim (4, < R1 = 2, R2 = 2, R3 = 2 >) \sim (1, < R1 = 2, R2 = 2, R3 = 2 >) \sim$$
$$(6, < R1 = 2, R2 = 2, R3 = 2 >) \sim (9, < R1 = 2, R2 = 2, R3 = 2 >)$$



6.4. Compuación para la entrada $R1 = 3$

$$(1, < R1 = 3, R2 = 0, R3 = 0 >) \sim (2, < R1 = 3, R2 = 0, R3 = 0 >) \sim (3, < R1 = 3, R2 = 0, R3 = 1 >) \sim$$
$$(4, < R1 = 3, R2 = 1, R3 = 1 >) \sim (1, < R1 = 3, R2 = 1, R3 = 1 >) \sim (2, < R1 = 3, R2 = 1, R3 = 1 >) \sim$$
$$(3, < R1 = 3, R2 = 1, R3 = 2 >) \sim (4, < R1 = 3, R2 = 2, R3 = 2 >) \sim (1, < R1 = 3, R2 = 2, R3 = 2 >) \sim$$
$$(2, < R1 = 3, R2 = 2, R3 = 2 >) \sim (3, < R1 = 3, R2 = 2, R3 = 3 >) \sim (4, < R1 = 3, R2 = 3, R3 = 3 >) \sim$$
$$(1, < R1 = 3, R2 = 3, R3 = 3 >)(6, < R1 = 3, R2 = 3, R3 = 3 >) \sim (9, < R1 = 3, R2 = 3, R3 = 3 >)$$



6.5. Función calculada

El programa calcula la función

$$f(x) = x$$

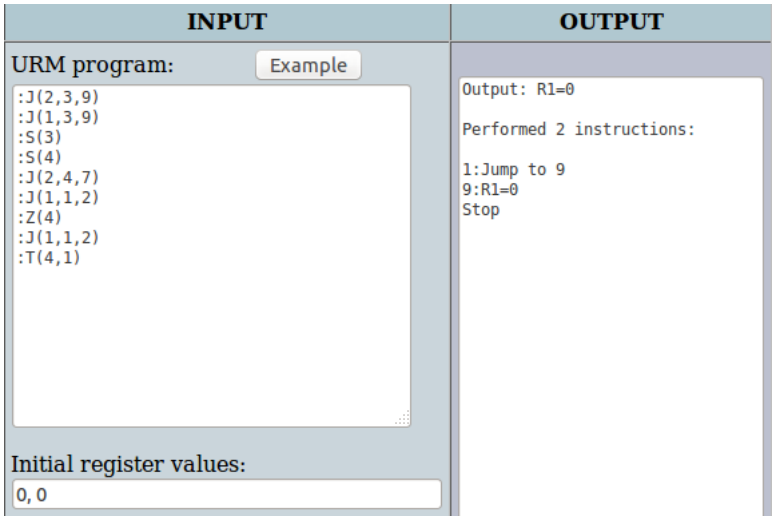
7. Ejercicio 7

Computaciones para el programa

```
J(2,3,9)
J(1,3,9)
S(3)
S(4)
J(2,4,7)
J(1,1,2)
Z(4)
J(1,1,2)
T(4,1)
```

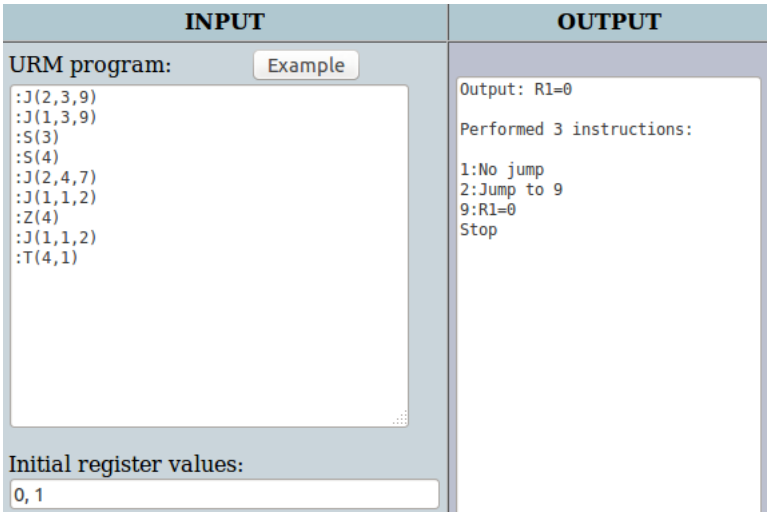
7.1. Computación para la entrada $R1 = 0$, $R2 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >) \sim (9, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >) \sim (10, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >)$$



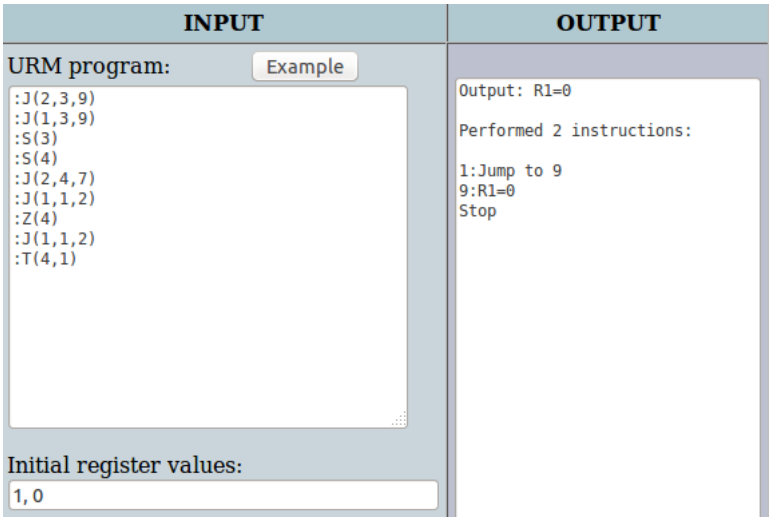
7.2. Computación para la entrada $R1 = 0$, $R2 = 1$

$$(1, < R1 = 0, R2 = 1, R3 = 0, R4 = 0 >) \sim (2, < R1 = 0, R2 = 1, R3 = 0, R4 = 0 >) \sim (9, < R1 = 0, R2 = 1, R3 = 0, R4 = 0 >) \sim (10, < R1 = 0, R2 = 1, R3 = 0, R4 = 0 >)$$



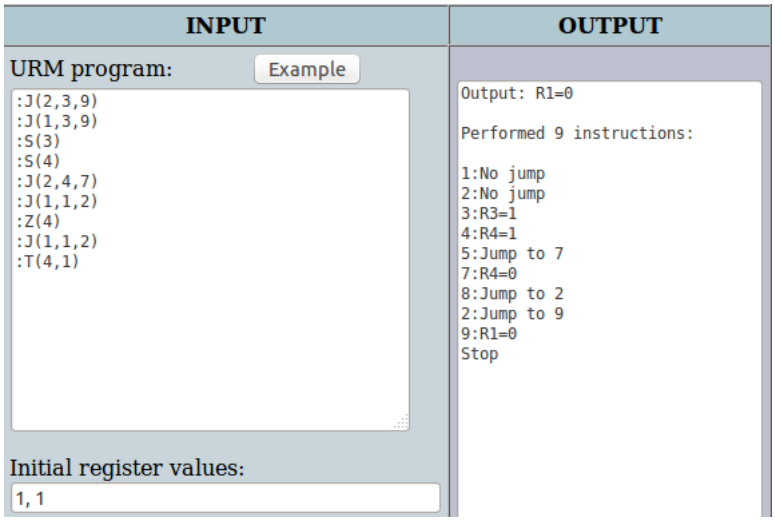
7.3. Computación para la entrada $R1 = 1$, $R2 = 0$

$$(1, < R1 = 1, R2 = 0, R3 = 0, R4 = 0 >) \sim (9, < R1 = 1, R2 = 0, R3 = 0, R4 = 0 >) \sim$$
$$(10, < R1 = 0, R2 = 0, R3 = 0, R4 = 0 >)$$



7.4. Computación para la entrada $R1 = 1$, $R2 = 1$

$$(1, < R1 = 1, R2 = 1, R3 = 0, R4 = 0 >) \sim (2, < R1 = 1, R2 = 1, R3 = 0, R4 = 0 >) \sim$$
$$(3, < R1 = 1, R2 = 1, R3 = 0, R4 = 0 >) \sim (4, < R1 = 1, R2 = 1, R3 = 1, R4 = 0 >) \sim$$
$$(5, < R1 = 1, R2 = 1, R3 = 1, R4 = 1 >) \sim (7, < R1 = 1, R2 = 1, R3 = 1, R4 = 1 >) \sim$$
$$(8, < R1 = 1, R2 = 1, R3 = 1, R4 = 0 >) \sim (2, < R1 = 1, R2 = 1, R3 = 1, R4 = 0 >) \sim$$
$$(9, < R1 = 1, R2 = 1, R3 = 1, R4 = 0 >) \sim (10, < R1 = 0, R2 = 1, R3 = 1, R4 = 0 >)$$



7.5. Función calculada

El programa calcula la función

$$f(x_1, x_2) = \begin{cases} x_1 \text{ mód } x_2 & \text{si } x_2 > 0 \\ 0 & \text{en otro caso} \end{cases}$$

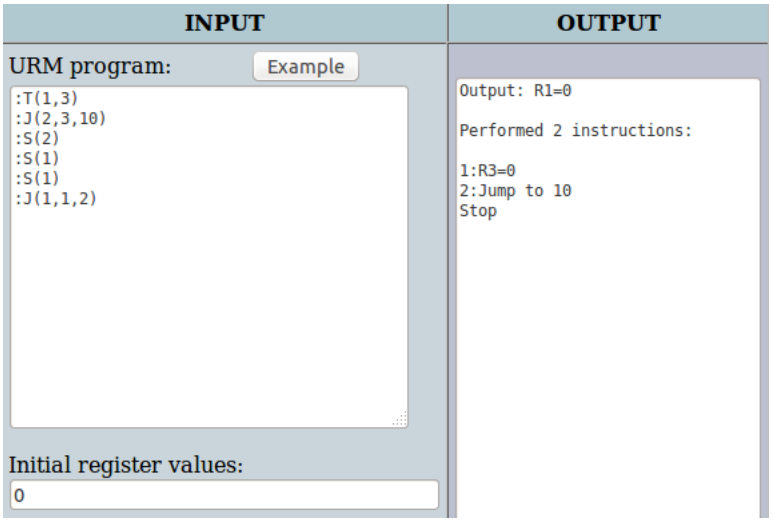
8. Ejercicio 8

Computaciones para el programa

```
T(1,3)
J(2,3,10)
S(2)
S(1)
S(1)
J(1,1,2)
```

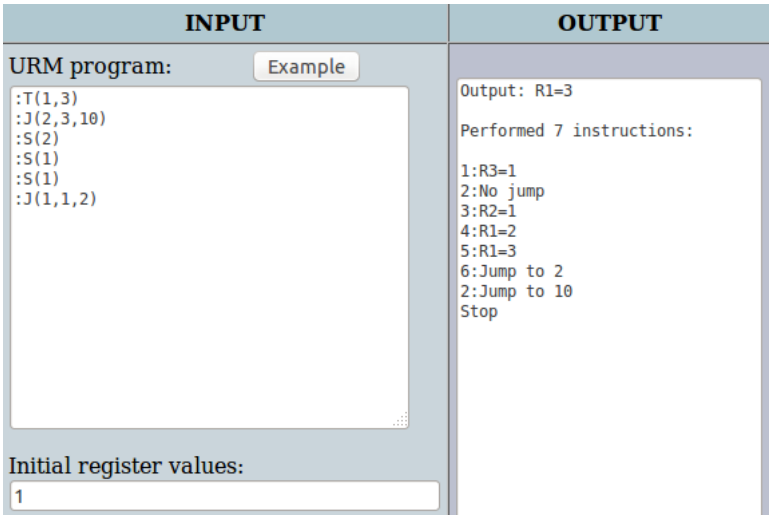
8.1. Computación para la entrada $R1 = 0$

$$(1, < R1 = 0, R2 = 0, R3 = 0 >) \sim (2, < R1 = 0, R2 = 0, R3 = 0 >) \sim (7, < R1 = 0, R2 = 0, R3 = 0 >)$$



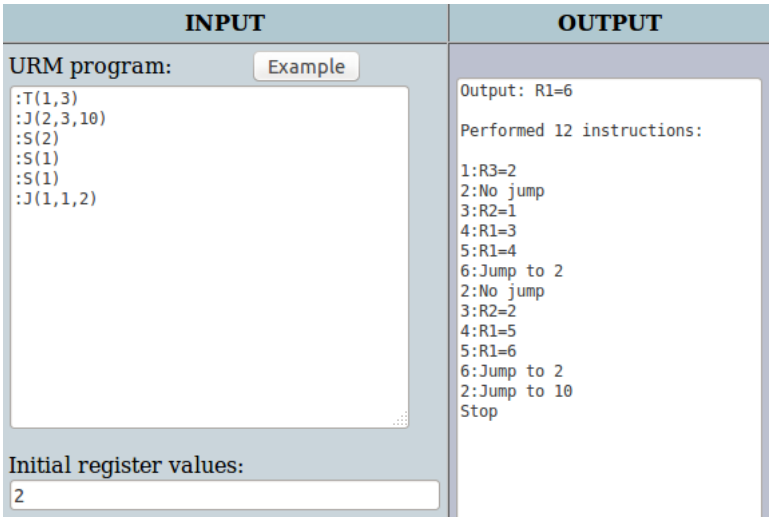
8.2. Computación para la entrada $R1 = 1$

$$(1, < R1 = 1, R2 = 0, R3 = 0 >) \sim (2, < R1 = 1, R2 = 0, R3 = 1 >) \sim (3, < R1 = 1, R2 = 0, R3 = 1 >) \sim$$
$$(4, < R1 = 1, R2 = 1, R3 = 1 >) \sim (5, < R1 = 2, R2 = 1, R3 = 1 >) \sim (6, < R1 = 3, R2 = 1, R3 = 1 >) \sim$$
$$(2, < R1 = 3, R2 = 1, R3 = 1 >) \sim (7, < R1 = 3, R2 = 1, R3 = 1 >)$$



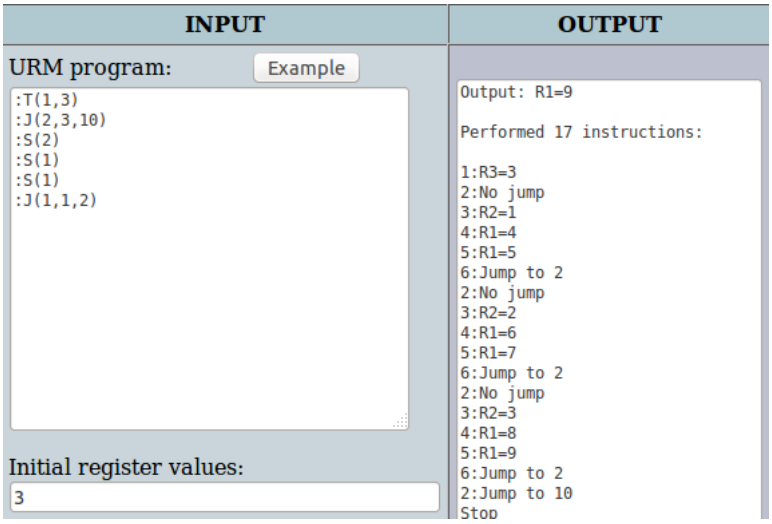
8.3. Computación para la entrada $R1 = 2$

$$(1, < R1 = 2, R2 = 0, R3 = 0 >) \sim (2, < R1 = 2, R2 = 0, R3 = 2 >) \sim (3, < R1 = 2, R2 = 0, R3 = 2 >) \sim$$
$$(4, < R1 = 2, R2 = 1, R3 = 2 >) \sim (5, < R1 = 3, R2 = 1, R3 = 2 >) \sim (6, < R1 = 4, R2 = 1, R3 = 2 >) \sim$$
$$(2, < R1 = 4, R2 = 1, R3 = 2 >) \sim (3, < R1 = 4, R2 = 1, R3 = 2 >) \sim (4, < R1 = 4, R2 = 2, R3 = 2 >) \sim$$
$$(5, < R1 = 5, R2 = 2, R3 = 2 >) \sim (6, < R1 = 6, R2 = 2, R3 = 2 >) \sim (2, < R1 = 6, R2 = 2, R3 = 2 >) \sim$$
$$(7, < R1 = 6, R2 = 2, R3 = 2 >)$$



8.4. Computación para la entrada $R1 = 3$

$$(1, < R1 = 3, R2 = 0, R3 = 0 >) \sim (2, < R1 = 3, R2 = 0, R3 = 3 >) \sim (3, < R1 = 3, R2 = 0, R3 = 3 >) \sim$$
$$(4, < R1 = 3, R2 = 1, R3 = 3 >) \sim (5, < R1 = 4, R2 = 1, R3 = 3 >) \sim (6, < R1 = 5, R2 = 1, R3 = 3 >) \sim$$
$$(2, < R1 = 5, R2 = 1, R3 = 3 >) \sim (3, < R1 = 5, R2 = 1, R3 = 3 >) \sim (4, < R1 = 5, R2 = 2, R3 = 3 >) \sim$$
$$(5, < R1 = 6, R2 = 2, R3 = 3 >) \sim (6, < R1 = 7, R2 = 2, R3 = 3 >) \sim (2, < R1 = 7, R2 = 2, R3 = 3 >) \sim$$
$$(3, < R1 = 7, R2 = 2, R3 = 3 >) \sim (4, < R1 = 7, R2 = 3, R3 = 3 >) \sim (5, < R1 = 8, R2 = 3, R3 = 3 >) \sim$$
$$(6, < R1 = 9, R2 = 3, R3 = 3 >) \sim (2, < R1 = 9, R2 = 3, R3 = 3 >) \sim (7, < R1 = 9, R2 = 3, R3 = 3 >)$$



8.5. Función calculada

El programa calcula la función

$$f(x) = 3x$$