

Atividade 1**Algorithm 2.9. Concurrent counting algorithm**

integer $n \leftarrow 0$	
p	q
<pre> integer temp p1: do 10 times p2: temp \leftarrow n p3: n \leftarrow temp + 1 </pre>	<pre> integer temp q1: do 10 times q2: temp \leftarrow n q3: n \leftarrow temp + 1 </pre>

2. Construct a scenario for Algorithm 2.9 in which the final value of n is 10.
3. (Ben-Ari and Burns [10]) Construct a scenario for Algorithm 2.9 in which the final value of n is 2.
4. For positive values of k , what are the possible final values of n in the following algorithm?

Algorithm 2.10. Incrementing and decrementing

integer $n \leftarrow 0$	
p	q
<pre> integer temp p1: do K times p2: temp \leftarrow n p3: n \leftarrow temp + 1 </pre>	<pre> integer temp q1: do K times q2: temp \leftarrow n q3: n \leftarrow temp - 1 </pre>

6. Consider the following algorithm where each of ten processes executes the statements with i set to a different number in $1, \dots, 10$:

Algorithm 2.16. Concurrent algorithm A

<pre> integer array[1..10] C \leftarrow ten distinct initial values integer array[1..10] D </pre>
<pre> integer myNumber, count p1: myNumber \leftarrow C[i] p2: count \leftarrow number of elements of C less than myNumber p3: D[count + 1] \leftarrow myNumber </pre>

- a. What does the algorithm do?
- b. What would happen if c in line $p3$ were replaced by D ?
- c. What would happen if the array C were initialized with values that are not all distinct? Correct the algorithm to take care of this case.

7. Consider the following algorithm:

Algorithm 2.17. Concurrent algorithm B

integer $n \leftarrow 0$	
p	q
<p>p1: while $n < 2$ p2: write(n)</p>	<p>q1: $n \leftarrow n + 1$ q2: $n \leftarrow n + 1$</p>

- Construct scenarios that give the output sequences: 012, 002, 02.
- Must the value 2 appear in the output?
- How many times can the value 2 appear in the output?
- How many times can the value 1 appear in the output?

8. Consider the following algorithm:

Algorithm 2.18. Concurrent algorithm C

integer $n \leftarrow 1$	
p	q
<p>p1: while $n < 1$ p2: $n \leftarrow n + 1$</p>	<p>q1: while $n \geq 0$ q2: $n \leftarrow n - 1$</p>

- Construct a scenario in which the loop in p executes exactly once.
- Construct a scenario in which the loop in p executes exactly three times.
- Construct a scenario in which both loops execute infinitely often.

10. Consider the following algorithm:

Algorithm 2.20. Stop the loop C

integer $n \leftarrow 0$ boolean flag \leftarrow false	
p	q
<p>p1: while flag = false p2: $n \leftarrow 1 - n$</p>	<p>q1: while $n = 0$ // Do nothing q2: flag \leftarrow true</p>

- Construct a scenario for which the program terminates.
- What are the possible values of n when the program terminates?
- Does the program terminate for all scenarios?
- Does the program terminate for all fair scenarios?