Compulsory assignment 2

INF4140, Fall term 2012

Final delivery date

Friday November 09th at 18.00.

How to deliver

- Your solution should be delivered online (https://devilry.ifi.uio.no/).

- Program examples should be commented in order to make them understandable for the group teacher or lecturer.

Who delivers

Everyone is required to deliver a solution. You may work alone or together with <u>one</u> other student. (Notice that you are not allowed to work together with more than one student.) In this case the two of you should deliver the same solution. **The solution must be marked with name and email address of the contributing students.**

Evaluation

This assignment is graded *pass* or *fail*.
You must pass this assignment in order to take the final exam.

Pleace read the Departemental guidelines for written assignments!

see `http://www.ifi.uio.no/studier/skjemaer/oblig-retningslinjer.pdf`
or `http://www.ifi.uio.no/studier/skjemaer/oblig-retningslinjer_eng.pdf`

1 The Roller Coaster Problem

Exercise 5.17 (a) in Andrews.
As for The Sleeping Barber problem, the processes must participate in several synchronization stages. The passengers must wait for the car to be present, and the car must wait for C passengers to enter. After the ride, the car must awaken all riding passengers. The solution does not have to prevent sneaking. Try to formulate a reasonable invariant based on your solution, but it is not necessary to prove the invariant using Programming Logic.

2 Greatest Common Divisor

Let n and m be positive integers. The following program will find the greatest common divisor $gcd(n, m)$ of n and m:

```
x = n, y = m;

while (x!=y) {
      co < if (x>y) x = x - y;>
      || < if (y>x) y = y - x;>
      oc
}
```

You may assume the following properties about the greatest common divisor (gcd):

$$x > y \Rightarrow gcd(x, y) = gcd(x - y, y)$$
$$gcd(x, x) = x$$
$$gcd(x, y) = gcd(y, x)$$

Do the following:

1. Use Programming Logic to prove the postcondition

$$\{x == gcd(n, m)\}.$$

   Use $gcd(x, y) == gcd(n, m)$ as loop invariant.

2. The program above consists of a `while` loop repeatedly executing an inner `co` statement. This means that two processes are started and terminated each time the loop body is executed. Is it possible to develop a corresponding program with a `co` statement at the outermost level and a while loop in each of the processes? The program should have the same postcondition. Explain your answer. What about interference?