Model Checking, SS 2013. Exercises for the tutorial on 21 June 2013.

Name: _____ Student number: _____

Q1 Consider the following code.

```
fun succ x = x+1
```

Check for given input `n` that the call `succ n` returns the successor of `n`.

Q2 Consider the following code.

```
fun f g x = if x>=0 then g x else f g (g x)
```

Check for given inputs `goo : a:{ v:int | v > 0 } -> b:{ v:int | v > 0 }` and `n > 0` that the call `f goo n` returns a positive number.

Q3 Consider the following code.

```
fun main n = assert (f succ n > 0)
```

(a) Check that the refinement type `a:{ v:int | v > 0 } -> b:{ v:int | v > 0 }` corresponds to `succ`.

(b) Check for given input `n > 0` that the call `main n` does not violate the assertion.

Q4 Consider the following code.

```
fun f x g = g(x+1)
fun h y = assert (y>0)
fun main n = if n>0 then f n h else ()
```

Check that the program is safe, i.e. check that for given input `n`, the call `main n` does not violate the assertion.