# 1993 Paper 7 Question 5

**Specification and Verification of Hardware**

You are given components `MUX`, `REG` and `COMP` whose behaviour is defined by

```
MUX(sw,in1,in2,out) = (∀ t. out t = (sw t → in1 t | in2 t))

REG v (in,out) = (out 0 = v) ∧ (∀ t. out(t+1) = in t)

COMP(in1,in2,out) = (∀ t. out t = (in1 t < in2 t))
```

Use these to implement a device `MAX` that satisfies the specification

```
MAX(in,out) ⇒ (∀ t. out t = Max in t)
```

where the function $Max$ is defined by

```
(Max in 0 = in 0) ∧
(Max in (n+1) = (Max in n < in(n+1) → in(n+1) | Max in n))
```

[10 marks]

Prove that your implementation meets its specification.          [10 marks]