

Challenge

Spare Time Teaching

September 15, 2014

You may not add parameters or change the output.

Problem

Prove in Coq that ackermann is increasing on the first argument.

Example

```
(* The predicate characterizing an Ackermann function *)  
Definition ap f :=  
  ∀ m n : N,  
    f 0 n = S n ∧  
    f (S m) 0 = f m 1 ∧  
    f (S m) (S n) = f m (f (S m) n).  
  
Lemma ackermann_is_increasing_on_the_first_argument:  
  ∀ f : N → N → N,  
    ap f → ∀ m n : N, S m ≤ f m n.  
Proof.  
  (* put proof here *)  
Qed.
```