DISCRETE MATHEMATICS MIDTERM EXAM 2014-2015

Ackerman's Function is defined as below and the next 2 questions are asked about the function.

$$A(m,n) = \begin{cases} 2n, & \text{if } m = 0 \\ 0, & \text{if } m \geq 1 \text{ and } n = 0 \\ 2, & \text{if } m \geq 1 \text{ and } n = 1 \\ A(m-1, A(m,n-1)), & \text{if } m \geq 1 \text{ and } n \geq 2 \end{cases}$$

1) (30 pts) Show that $A(m,2) = 4$ whenever $m \geq 1$.

2) (30 pts) Prove that $A(i,j) \geq j$ whenever i and j are nonnegative integers.

3) (40 pts) Prove that there are infinitely many primes congruent to 2 modulo 4.

You have 45 minutes, good luck…