

# Homework 4

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## Problem 1

Suppose  $n \in \mathbb{N}$ . By definition  $a_1 = 4$ , and  $a_2 = 9$ . By inductive hypothesis if  $n \geq 2$  then  $a_n > a_{n-1}$ . Suppose to the contrary that  $a_{n+1} \leq a_n$ . Then

$$\begin{aligned} 3(a_n - 1) &\leq a_n \\ a_n &\leq \frac{3}{2} \end{aligned}$$

a contradiction because  $a_2 = 9$ . Let  $n, m \in \mathbb{N}$ , and suppose to the contrary that  $a_n = a_m$  with  $n \neq m$ . But if  $n \neq m$ , then wlog  $n < m$  and  $a_n < a_m$ , a contradiction because  $<$  is transitive.

## Problem 2