CSC236 tutorial exercises, Week #7
best before Thursday evening

These exercises are intended to give you practice proving facts about a recurrence.

1. Examine the recurrence $R(n)$ below.

$$R(n) = \begin{cases} 0 & \text{if } n = 1 \\ n + 3R(\lceil n/3 \rceil) & \text{if } n > 1 \end{cases}$$

   Last week we conjectured that if $n = 3^k$ for some natural number k, then $R(n) = n \log_3 n$.

   (a) Use induction to prove this conjecture.

   (b) Emulate the lemma 3.6 on page 84 of the CSC236 notes, to prove that R is nondecreasing on natural numbers greater than, or equal to, 1.