CSC236 Worksheet 5 Review

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Question 1

a. **Rough Work:**

Define $P(k) : R(3^k) = k3^k$. Note that when $n = 3^k$, this is equivalent to $R(n) = n \log_3 n$. I will use simple induction to prove $P(k)$.

1. Base Case ($k = 0$)

   Let $k = 0$.

   Then,

$$\begin{aligned} R(3^k) &= 0 && \text{[By def., since } n = 3^0 = 1\text{]} && (1)\\ &= 0 \cdot 3^0 && && (2)\\ &= k \cdot 3^k && && (3) \end{aligned}$$

   Thus, $P(k)$ is verified in this step.

2. Inductive Step