CSC236 Worksheet 2 Review

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Question 3

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Rough Works:

For convenience, define $P(n) : f(n) \leq 3^n$. I will use complete induction to prove that $\forall n \in \mathbb{N}$, $P(n)$.

- Inductive Step

  Let $n \in \mathbb{N}$. Assume $H(n) : \bigwedge_{i=0}^{n-1} P(i)$. I will show $P(n)$ follows.

- Base Case ($n = 0$)

  Let $n = 0$.

  Then,

$$\begin{aligned} f(n) &= 1 && \text{[By def.]} && (1)\\ &= 3^0 && && (2)\\ &\leq 3^0 && && (3)\\ &= 3^n && && (4) \end{aligned}$$

  Thus, $P(n)$ follows.

- Base Case ($n = 1$)
- Case ($n > 1$)