Let $e_0 = 1$, $e_1 = 4$ and, for $k > 1$, let $e_k = 4(e_{k-1} - e_{k-2})$. Prove that $e_n > 2^n$ for all $n \geq 1$.

Answer:
Basis step: $2^1 = 2 < 4 = e_1$  \quad $2^2 = 4 < 4(4 - 1) = 12$
Inductive step: Assume $P(i)$ is true for every $i$ $1 \leq i \leq k$.
\[ e_{k+1} = 4(e_k - e_{k-1}) > 4(2^k - 2^{k-1}) = 4(2^{k-1})(2 - 1) = 2^2(2^{k-1}) = 2^{k+1} \]