

(Problem 6) Use the provided definitions, and prove or disprove: $2^n \in \Theta(3^n)$.

Let's see if $3^n \in O(2^n)$.

Take any c . Now choose a number k such that $c < (\frac{3}{2})^k$ (such number exists as $(\frac{3}{2})^n$ is not upper bounded).

For any $n > k$, $c2^n < (\frac{3}{2})^k 2^n < (\frac{3}{2})^n 2^n = 3^n$. So we have seen that for each value of c there is a number k such that for any $n > k$, $c2^n < 3^n$. For this reason $3^n \notin O(2^n)$.

We can conclude that the assertion is false.