

**1-7.** *Soln.*

(a) Let  $2^{n+1} \leq c * 2^n$  for some constant  $c$ . Observe that  $2^{n+1} \leq 2 * 2^n = c * 2^n$  for  $c = 2$ , thus  $2^{n+1} = O(2^n)$ .

(b)  $\lim_{n \rightarrow \infty} \frac{2^n}{2^{2n}} = 2^{n-2n} = 2^{-n} = 0$ , thus  $2^{2n} \gg 2^n$  which implies that there exists no constant  $c$  for which  $2^{2n} \leq c * 2^n$ .  
Thus  $2^{2n} \neq O(2^n)$ .