Assignment 2

1.1 Are either 2^{n+1} or 2^{2n} big-O of 2^n?

The former is, the latter is not. Suppose $2^{n+1} = O(2^n)$, then $2 \cdot 2^n \leq c \cdot 2^n$ as $n \to \infty$; this is obviously true for all $c \geq 2$. Regards to whether $2^{2n} = O(2^n)$, consider the inequality $2^{2n} \leq c \cdot 2^n$. This is equivalent to saying $2^n \cdot 2^n \leq c \cdot 2^n$. Dividing both sides by 2^n gives $2^n \leq c$, which is obviously false (the exponential function is not constant bound).