

Math 2013 - Introduction to Discrete Mathematics

Quiz #14 - 2005.11.21

Solutions

Let $f(n) = 4n^2 - 16n + 32$. (also notice that $f(n) \geq 0$ for $n \geq 0$).
Find values of $C > 0$ and $n_0 \in \mathbb{N}$ such that $f(n) = \mathcal{O}(n^2)$.

Notice that

$$|4n^2 - 16n + 32| = 4n^2 - 16n + 32 \leq 4n^2 + 32 \leq 36n^2$$

Thus $n_0 = 1$ and $C = 36$ will work.

Find values of $D > 0$ and $n_0 \in \mathbb{N}$ such that $f(n) = \Omega(n^2)$.

$$|4n^2 - 16n + 32| = 4n^2 - 16n + 32 \geq 2n^2$$

Notice this is true since $(n - 4)^2 = 2n^2 - 16n + 32 \geq 0$. Thus $D = 2$ and $n = 1$.