CS 410/586: Quiz 2, 5 April 2011 Name:____KEY_____

No books or notes. Work individually.

Question 1 (3 points): Is

$$f(n) = 3 + n^2 \text{ in } O(n^2)?$$

Explain why or why not.

Yes. Let $c = 2$. Then for any $n > 2$, $n^2 > 4$. So $2 \cdot n^2 > 4 + n^2 > 3 + n^2$.

Question 2 (3 points): Is

$$f(n) = 3 \cdot n^2 \text{ in } O(n^2)?$$

Explain why or why not.

Yes. Let $c = 3$. Then for any $n > 0$, $3 \cdot n^2 \geq 3 \cdot n^2$.

Question 3 (4 points): Is

$$f(n) = (n^2)^3 \text{ in } O(n^2)?$$

Explain why or why not.

No. Suppose there is $c > 0$, and an n_0, such that $c \cdot n^2 \geq (n^2)^3 = n^6$, for $n > n_0$. Then $c \geq n^4$, for $n > n_0$. But clearly there is no such c. For example, choose $n = 2c$. Then $c < n^4 = 16c^4$ for any positive n.