Lab8 Assignment

Deadline is on October 19, 2020 at 2pm. Submit on iCollege.

Question#1

Prove that $f(x)=3x^5$ is not $O(x^4)$

$3x^5$ is not x^4

Let there exist constants c and x_0 such that $x \geq x_0$ for all x.

$3x^5 \leq c \cdot x^4$

Multiplying and dividing by x^4

$$\frac{3x^5}{x^4} \leq \frac{cx^4}{x^4}$$

$3x \leq c$

Dividing by 3

$$\frac{3x}{3} \leq \frac{c}{3}$$

$$x \nleq \frac{c}{3}$$

If $f(x)$ should be an $O(x^4)$, the above inequality should be true for all $x \leq x_0$. If x is the maximum of $\frac{c}{3}$ or x_0, $x \geq x_0$ and $x > \frac{c}{3}$. This is a contradiction, so $f(x)$ is not $O(x^4)$.