**Problem statement** Suppose $n$ is a positive integer, and $f$ is the function $f(x) = nx^{(n^2)}$. For example, if $n = 5$, $f(x) = 5x^{25}$.

a) What is the <u>largest value</u> of $f$ on the unit interval, $[0, 1]$? Your answer will depend on $n$. What happens to this value as $n \to \infty$?

b) What is the <u>average value</u> of $f$ on the unit interval, $[0, 1]$? Your answer will depend on $n$. What happens to this value as $n \to \infty$?

c) The asymptotic behavior of the answers to a) and b) are different as $n \to \infty$. Briefly explain why this is possible. You may refer to graphs of functions if that is helpful.