$$\lim_{x \to \infty} \log^4 n + 4n(\log n)^3 \frac{1}{n}$$

$$n^2 \in \Omega(n(\log n)^3)$$

$$n^2 \geq cn(\log n)^2$$ let $n = 8$

$$\frac{8}{9} \geq$$

$$n \geq c(\log n)^2$$

$$\frac{n}{(\log n)^3} \geq c$$ len $c = \frac{8}{9}$

$n_0 = 8$

$$n^2 \geq cn(\log n)^3$$ for all $n \geq 8$ when $c = \frac{8}{9}$

$$15n^3 + 20n^2 \log n + 2015 \leq cn^3$$ for some c and $n \geq n_0$

$$c \geq 15 + \frac{20 \log n}{n} + \frac{2015}{n3}$$

let $c =$

$8n - \frac{n^2}{n-200} \in \Theta(n)$

$0 \leq c_1 n \leq 8n - \frac{n^2}{n-200} \leq c_2 n$

$c_1 \leq 8 - \frac{1}{1-\frac{200}{n}} \leq c_2$

$c_1 = 4$

$2^n \in \omega(n^{50})$

$2^n > cn^{50}$ for all $c > 0$

$n \ln 2 > \ln c + 50 \ln n$

$n - 50 \ln n > \ln c$

$1395n \in o(n \log n)$

$1395n < cn \log n$ for all $c > 0$

$\frac{1395}{\log n} <$

$$\frac{n(\log n)^4}{n\sqrt{n}}$$

$$\frac{\log n^4}{n^{\frac{1}{2}}} = \frac{4\frac{1}{n}\log n^3}{\frac{1}{2}n^{-\frac{1}{2}}}$$

$$\frac{c\log n^3}{n\, n^{-\frac{1}{2}}}$$