

M2 S13

$$f(n) = n^2, g(n) = e^{0.0001n}$$

$$\lim_{n \rightarrow \infty} \frac{n^2}{e^{0.0001n}} = \frac{\infty}{\infty} = \text{indeterminate}$$

$$\lim_{n \rightarrow \infty} \frac{2n}{0.0001 e^{0.0001n}} - \text{Using L'Hopital's rule}$$

$$\lim_{n \rightarrow \infty} \frac{2}{(0.0001)^2 e^{0.0001n}} = \frac{2}{e^{\infty}} = \frac{2}{\infty} = 0 - \text{Using L'Hopital's rule}$$

From the above we can see that $g(n)$ will grow faster than $f(n)$, such that

$$f(n) \in O(g(n))$$

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