

Quiz 5 S12

$$f(n) = 3n^2 + 6n^{2.5} \quad g(n) = n^3$$

$$\lim_{n \rightarrow \infty} \frac{3n^2 + 6n^{5/2}}{n^3} = \frac{\infty}{\infty}, \text{ indeterminate}$$

$$\lim_{n \rightarrow \infty} \frac{6n + 15n^{3/2}}{3n^2} = \frac{\infty}{\infty}, \text{ indeterminate}$$

$$\lim_{n \rightarrow \infty} \frac{6 + \frac{45}{2}n^{1/2}}{6n} = \frac{\infty}{\infty}, \text{ indeterminate}$$

$$\lim_{n \rightarrow \infty} \frac{\frac{45}{4}n^{-1/2}}{6}$$

$$= \frac{\frac{45}{4} \cdot n^{-1/2}}{6}$$

$$= \frac{45n^{-1/2}}{24}$$

$$= \frac{45}{24} \cdot \frac{1}{n^{1/2}} = \frac{45}{24n^{1/2}} = \frac{45}{\infty} = 0$$

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

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

Where $g(n)$ will grow faster than $f(n)$.