

# Welcome to Math 102:107!

Why are cells so small?

As the cell gets bigger, volume vs. surface area

Nutrient consumption vs. absorption

$$\frac{4}{3}k_2\pi r^3 \gg 4k_1\pi r^2$$

when  $r$  is large  
because of degree

## Power Functions

$$\begin{array}{l} x^2 \quad \checkmark \\ 3x^2 \quad \checkmark \\ 2x^3 \quad \checkmark \\ 5.7x^{10} \quad \checkmark \\ 2^x \quad \times \end{array}$$

For two power functions

$$ax^m \quad bx^n \quad \text{with } m > n,$$

$$\begin{array}{l} \text{As } x \rightarrow \infty, \quad ax^m > bx^n \\ \text{As } x \rightarrow 0, \quad ax^m < bx^n \end{array}$$

When is consumption = absorption? (How big can a cell be?)

$$\frac{4}{3}k_2\pi r^3 = 4k_1\pi r^2$$

$$\frac{1}{3}k_2r = k_1$$

$$r = 3\frac{k_1}{k_2}$$