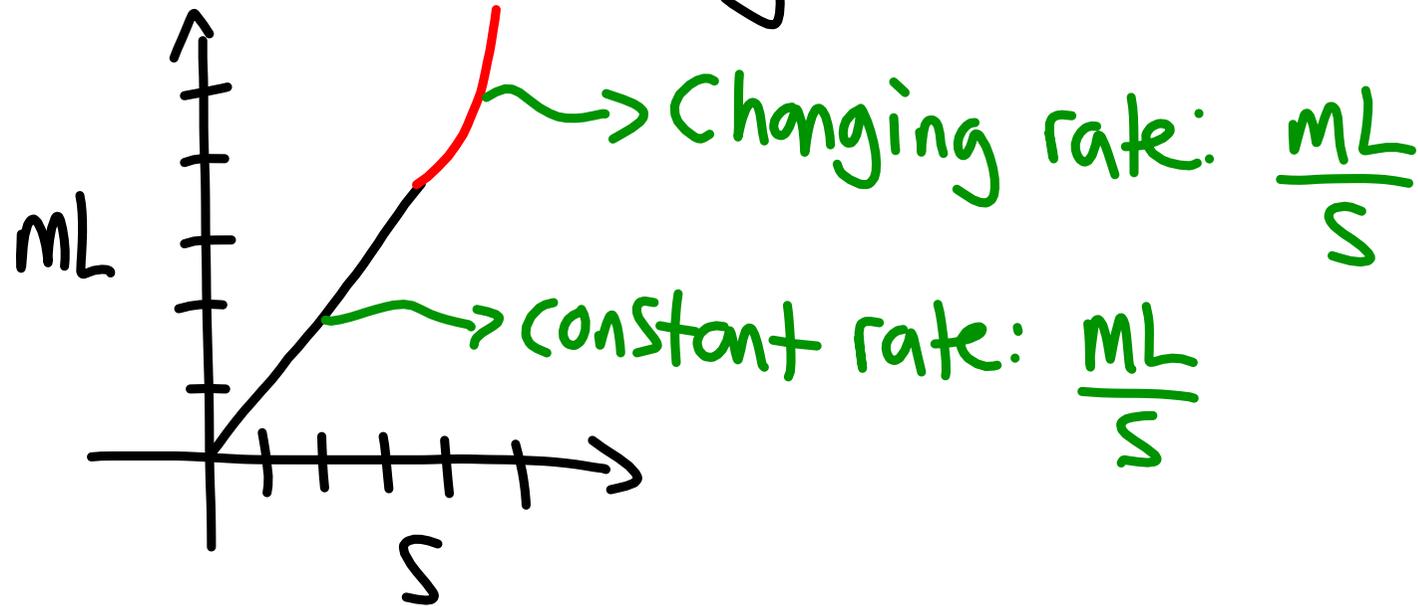
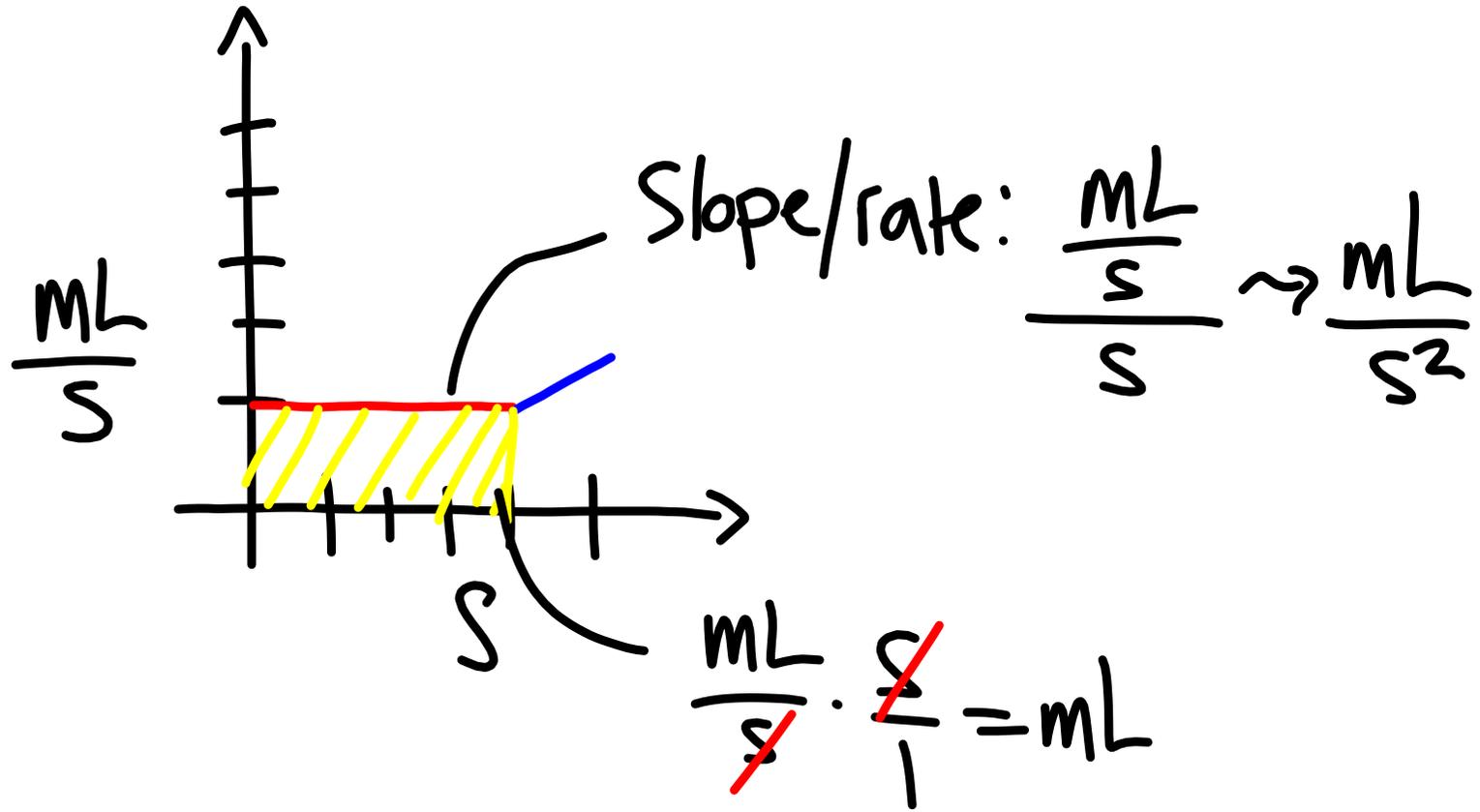
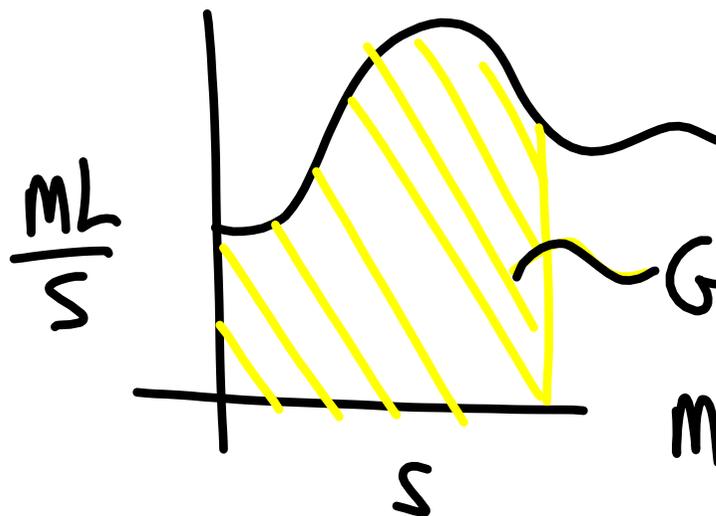


Filling a Container

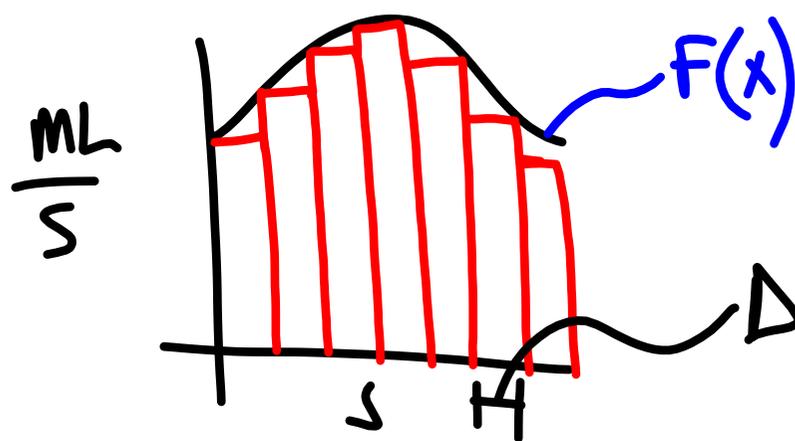




What if....

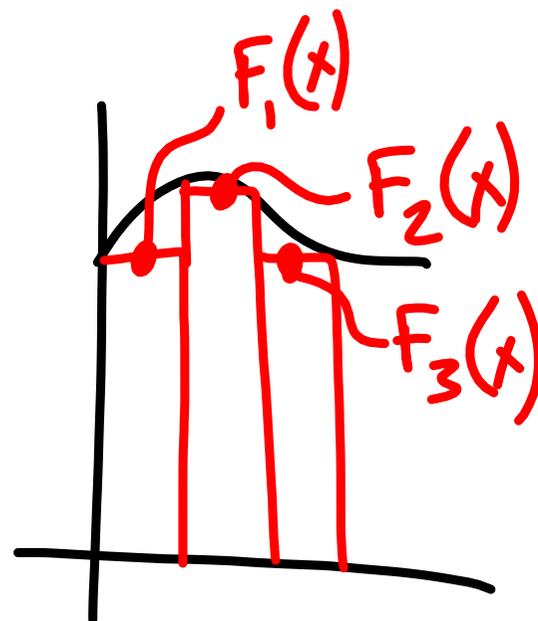


Goal: Find area
 Method: Divide area into rectangles

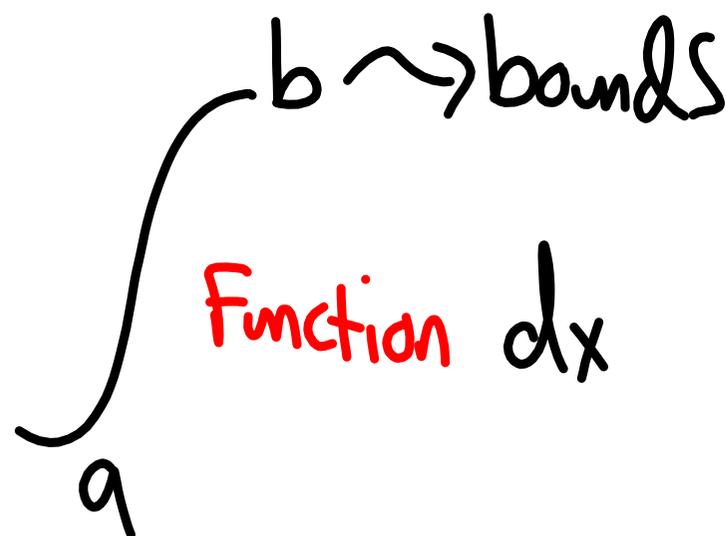


Imagine this goes to zero

$$\lim_{\Delta x \rightarrow 0} \sum_{i=1}^n F_i(x) \Delta x$$



Or: Use an integral



ex: Indefinite Integral (No bounds)

$$f(x) = 3x^3 \quad \int 3x^3 dx = \frac{3}{4}x^4$$

$$f(x) = 5x^3 + 3x^2 \quad \int 5x^3 + 3x^2 dx$$

$\frac{5}{4}x^4 + \frac{3x^3}{3} \rightarrow \frac{3}{3}x^3$

Ex: Definite Integral (bounds)

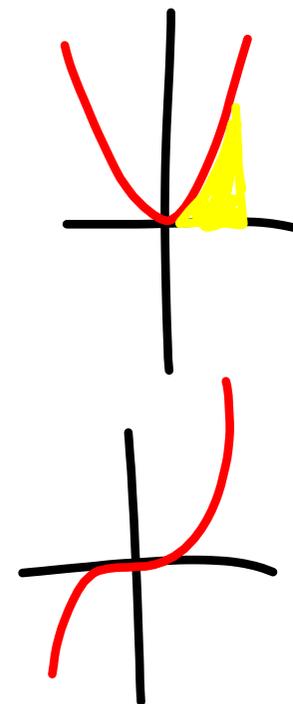
$$F(x) = 3x^2$$

$$g(x) = 2x + 3$$

$$\int 2x + 3 \, dx \rightarrow \frac{2x^2}{2} + \frac{3x^1}{1}$$

$$\int_0^5 3x^2 \, dx \rightarrow \frac{3x^3}{3} \rightarrow x^3 + C$$

Constant of integration



$$x^3 + c \Big|_0^5 \left[5^3 + c \right] - \left[0^3 + c \right]$$

$$\left[125 + \cancel{c} \right] - \left[\cancel{c} \right]$$

$$\textcircled{125}$$