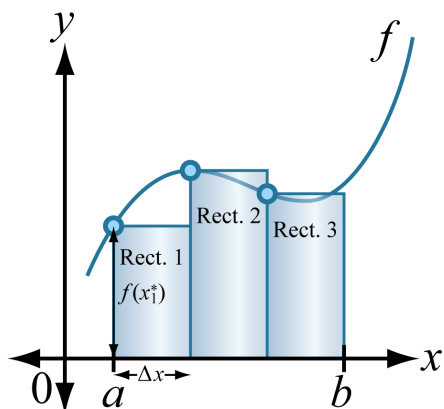
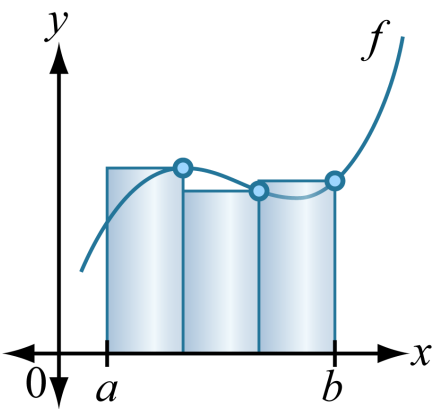


# Definite integral formalizes notion of area under curve

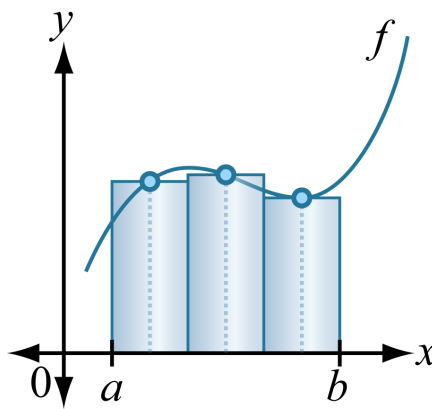
Left Riemann sum  
LRAM



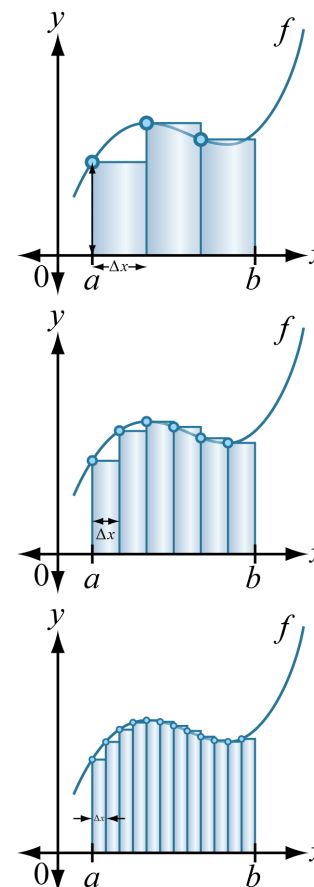
Right Riemann sum  
RRAM



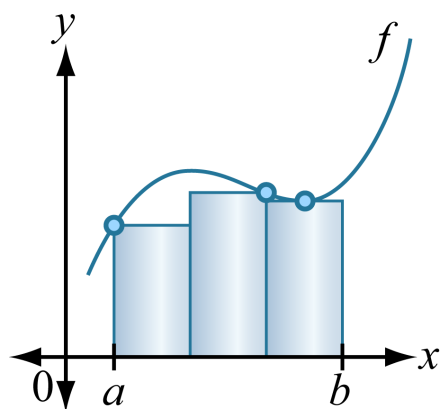
Midpoint Riemann sum  
MRAM



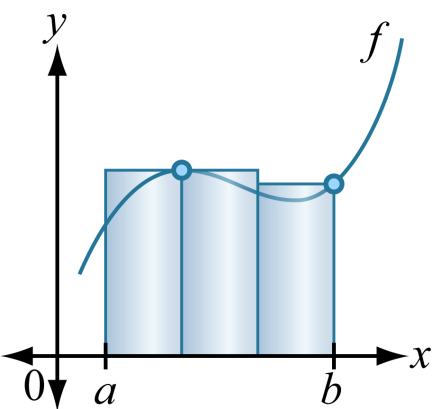
Limiting process



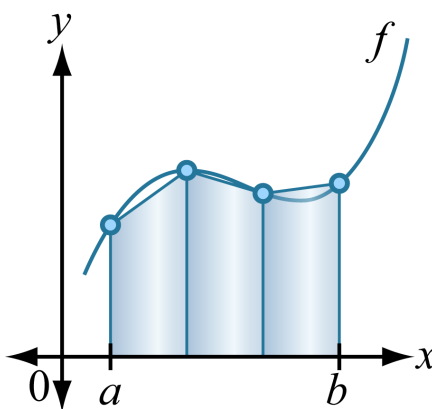
Lower Riemann sum



Upper Riemann sum



Trapezoidal approximation



Definite integral

$$\int_a^b f(x) dx := \lim_{\Delta x \rightarrow 0} \sum_{i=1}^N f(x_i^*) \Delta x, \quad N = \frac{b-a}{\Delta x}$$