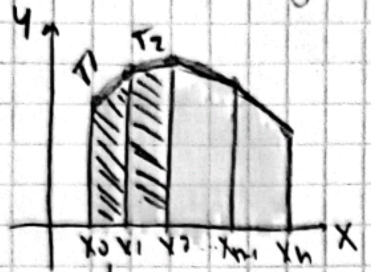
Demostración regla del trapecio:



$$A_{\square} = h_1 \cdot \Delta x$$

$$A_{\Delta} = \frac{\Delta x (h_2 - h_1)}{2}$$

$$A = h_1 \Delta x + \frac{\Delta x\, h_2}{2} - \frac{\Delta x\, h_1}{2}$$

$$= \frac{h_1 \Delta x}{2} + \frac{h_2 \Delta x}{2}$$

$$A = \frac{1}{2}\Delta x (h_1 + h_2)$$

$$T_1 = \frac{1}{2}\Delta x (f(x_0) + f(x_1))$$

$$T_2 = \frac{1}{2}\Delta x (f(x_1) + f(x_2))$$

$$\vdots$$

$$A \approx \frac{1}{2}\Delta x f(x_0) + \frac{1}{2}\Delta x f(x_1) + \frac{1}{2}\Delta x f(x_1) + \frac{1}{2}\Delta x f(x_2) + \frac{1}{2}\Delta x f(x_2) + \dots + \frac{1}{2}\Delta x f(x_{n-1}) + \frac{1}{2}\Delta x f(x_n)$$

$$A \approx \frac{1}{2}\Delta x f(x_0) + \Delta x f(x_1) + \Delta x f(x_2) + \dots + \Delta x f(x_{n-1}) + \frac{1}{2} f(x_n)$$

$$A \approx \frac{1}{2}\Delta x \left[f(x_0) + 2f(x_1) + 2f(x_2) + \dots + 2f(x_{n-1}) + f(x_n) \right]$$

$$\int_a^b f(x)\,dx \approx \frac{\Delta x}{2}\Big[f(a) + 2f(a+\Delta x) + 2f(a+2\Delta x) + 2f(a+3\Delta x) + \dots + 2f(a+(n-1)\Delta x) + f(b)\Big]$$

$$\approx \frac{\Delta x}{2}\Big[1f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + \dots + 2f(x_{n-1}) + 1f(x_n)\Big]$$

Coeficientes:

(1, 2, 2, 2 ... , 2, 1) → Siempre se cumple en la regla del trapecio, como se demostró

$\Delta x = \dfrac{b-a}{n}$