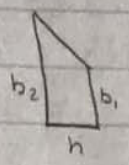
5.9 Approx. integration

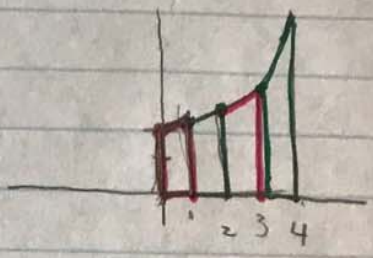
$A_{trap} = \frac{1}{2} \cdot h \cdot (b_1 + b_2)$



ex: find the area under the curve of the function

$y = \frac{1}{4}x^2 + 2 \quad [0, 4]$

$\int_0^4 \frac{1}{4}x^2 + 2\,dx$



for evenly spaced intervals

$h = \Delta x = \frac{b-a}{n}$

Trapezoidal Rule

$\int_a^b f(x)\,dx \approx T_n = \frac{\Delta x}{2}\left[f(x_0) + 2f(x_1) + 2f(x_2) + \dots + 2f(x_{n-1}) + f\right.$

$\Delta x = \frac{4-0}{4} = 1$

$T_4 = \frac{1}{2}(1)\left[f(0) + 2f(1) + 2f(2) + 2f(3) + f(4)\right]$

$f(0) \quad f(1) \quad f(2) \quad f(3)$

$\approx \frac{1}{2}\left[2 + 2(2.25) + 2(3) + 2(4.25) + 6\right]$

≈ 13.5

Midpoint Rule

$\int_a^b f(x)\,dx \approx M_n = \Delta x\left[f(\bar{x}_1) + f(\bar{x}_2) + \dots f(\bar{x}_n)\right]$

where $\Delta x = \frac{b-a}{n}$

5.9 6-12 evens 28 (trap