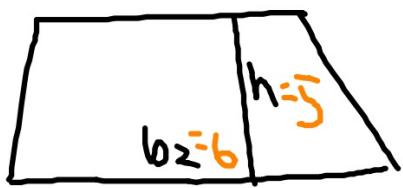


4.6 Trapezoid Rule

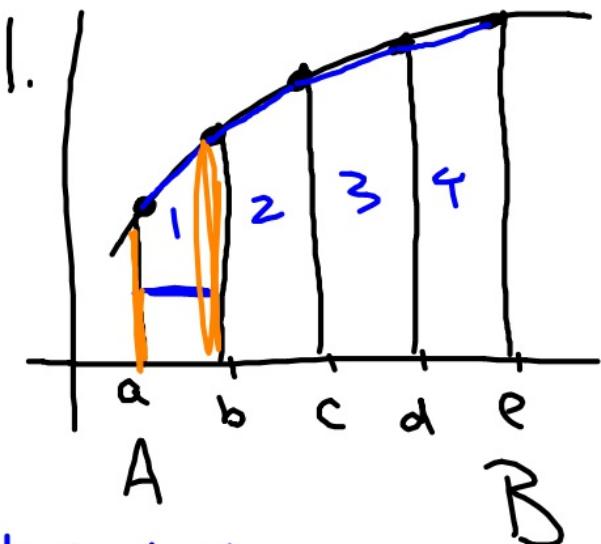
W^{CID}? I can find area under a curve using trapezoids

$$b_1 = 4$$

A.



$$\begin{aligned} A &= \frac{1}{2} (b_1 + b_2) \cdot h \\ &= 25 \end{aligned}$$



$$\frac{b-a}{n}$$

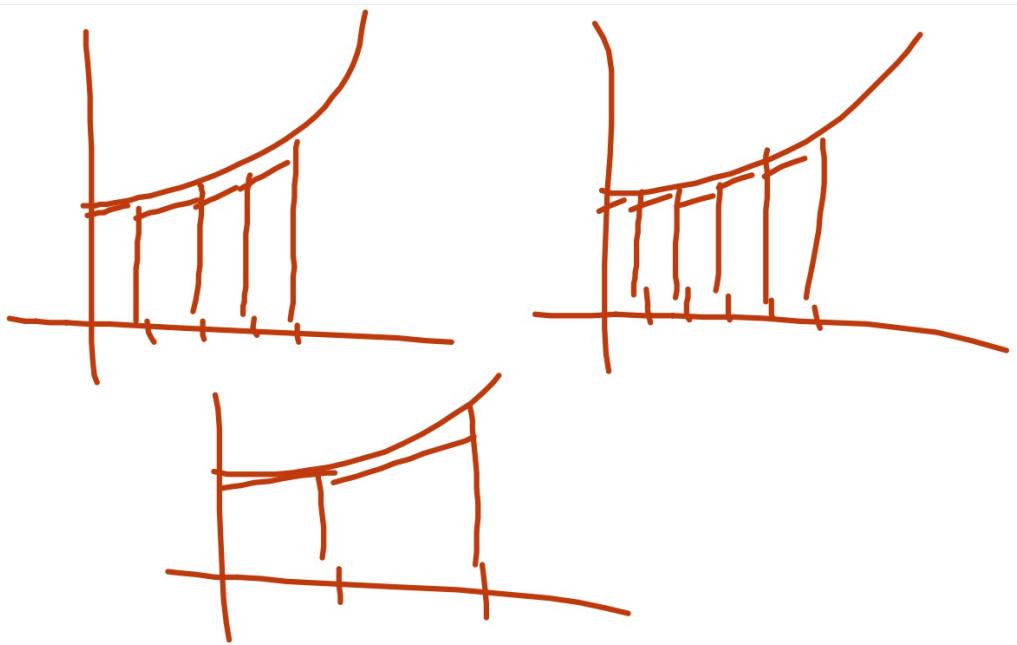
$$\begin{aligned}
 & \frac{b-a}{n} \cdot \frac{1}{2} (f(a)+f(b)) + \frac{b-a}{n} \cdot \frac{1}{2} (f(b)+f(c)) + \\
 & \frac{b-a}{n} \cdot \frac{1}{2} (f(c)+f(d)) + \frac{b-a}{n} \cdot \frac{1}{2} (f(d)+f(e)) \\
 & \frac{b-a}{2n} \left[f(a) + 2f(b) + 2f(c) + 2f(d) + f(e) \right]
 \end{aligned}$$

Ex. $\int_0^2 x^2 dx$, $n=4$, trapezoid Rule

$$\begin{aligned} \frac{b-a}{n} &= \frac{2-0}{4} \\ &= \frac{1}{2} \\ A_T &= \frac{1}{2} \cdot \frac{1}{2} [f(0) + 2f\left(\frac{1}{4}\right) + 2f\left(\frac{1}{2}\right) + 2f\left(\frac{3}{4}\right) + f(2)] \\ &= \frac{1}{4} [0 + 2\left(\frac{1}{16}\right) + 2\left(\frac{1}{4}\right) + 2\left(\frac{9}{16}\right) + 4] \\ &= \frac{1}{4} [0 + \frac{1}{8} + 2 + \frac{9}{8} + 4] \\ &= 11/4 \end{aligned}$$

$$\text{Ex. } \int_0^1 (x^2) dx \quad n=5$$

$$\begin{aligned}
 \frac{b-a}{n} &= \frac{1-0}{5} \\
 &= \frac{1}{5} \\
 &= .2
 \end{aligned}
 \quad \left\{ \begin{aligned}
 &\frac{1}{5} \cdot \frac{1}{2} \left[f(0) + 2f(.2) + 2f(.4) + 2f(.6) + 2f(.8) + f(1) \right] \\
 &\frac{1}{10} \left[1 + 2(1.04) + 2(1.16) + 2(1.36) + 2(1.64) \right. \\
 &\quad \left. + 2 \right] \\
 &\frac{1}{10} \left[1 + 2.08 + 2.32 + 2.72 + 3.28 + 2 \right] \\
 &= 1.34
 \end{aligned} \right.$$



P. 3/4
3-8(not 4)