5-5 TRAPEZOID RULE

SEE FIG. 5.31 ON p.289

ESTIMATES AREA USING TRAPEZOIDS INSTEAD OF RECTAN

h = WIDTH OF TRAPEZOID   T = AREA

$$\boxed{T = \frac{h}{2}\left(y_0 + 2y_1 + 2y_2 + \cdots + 2y_{n-1} + y_n\right)}$$

TO ESTIMATE $\int_a^b f(x)\,dx$ $h = \frac{b-a}{n}$

NOTE: $T = \frac{LRAM + RRAM}{2}$

EXAMPLE 1 p. 290 ESTIMATE $\int_1^2 x^2\,dx$ $n=4$

X	Y
1	1
1.25	1.5625
1.5	2.25
1.75	3.0625
2	4

$Y = X^2$ TI-89 TABLE TBLSET

TBLSTART=1 ΔTbl=.25

$$T = \frac{.25}{2}\left(1 + 2(1.5625) + 2(2.25) + 2(3.0625) + 4\right)$$

$$\boxed{T = 2.34375}$$

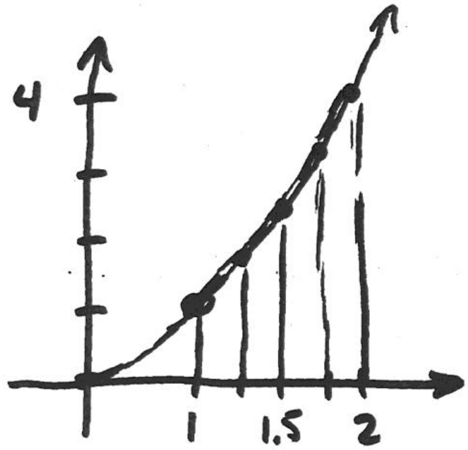
ACTUAL $\left.\frac{x^3}{3}\right]_1^2 = \frac{2^3}{3} - \frac{1^3}{3} = 2.33333$

ERROR = 2.34375 − 2.33333 = .01042

~~UPPER BOUND FOR ERROR~~$_T$ $\cancel{|E_T| \le \frac{b-a}{12} h^2 M}$

~~(M IS THE LARGEST VALUE f'' TAKES ON OVER [a,b])~~

$\cancel{|E_T| \le \frac{2-1}{12} .25^2 (2) = \underline{.01042}}$



DUE TO THE CONCAVITY OF $Y=X^2$ THE TRAPEZOID ESTIMATE IS HIGHER THAN THE ACTUAL.

$2.34375 > 2.33333$

THERE ARE OTHER HARDER MORE ACCURATE METHODS SUCH AS <u>SIMPSONS RULE</u> THAT WE WILL NOT DO. → (p. 292)

HOMEWORK p. 295 → 2, 3, 5, 7

CHAPTER REVIEW
p. 298-299 → 2, 4, 5, 9, 12, 19, 23, 30
38, 40, 41
ALSO p. 286 #27 (AGAIN)