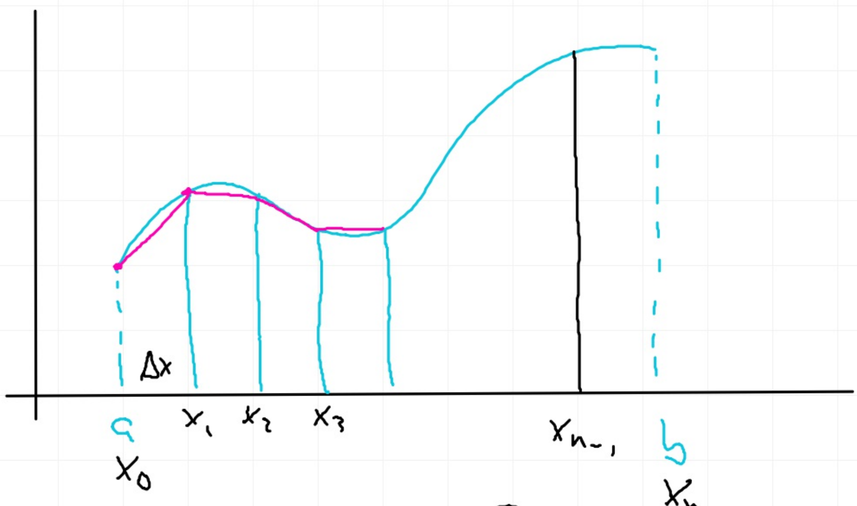
The Trapezoid Rule

(Another way to approximate area/estimate the value of a definite integral.)



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

$$\int_a^b f(x)\,dx \approx \frac{b-a}{2n}\sum_{i=0}^{n} h_i \cdot f(x_i)$$

$\hookrightarrow h_i = 1 \sim 2$

```
y1 = func.
seq(x,x,a,b,Δx) → a
y1(a) → b
{1,2,2,...,1} → k
k*b → c
sum(c)
* Δx/2
```

Est. $\int_3^7 \sqrt{x-1}\,dx$ using TR with $n=5$.

$\Delta x = \frac{4}{5} = .800$

$\frac{b-a}{2n} = .400$

$\int_3^7 \sqrt{x-1}\,dx \approx (.4)(19.761)$

≈ 7.904

	$f(x_i)$	h_i	$h\,f(x_i)$
$x_0 = 3$	1.414	1	1.414
$x_1 = 3.800$	1.673	2	3.347
$x_2 = 4.600$	1.897	2	3.795
$x_3 = 5.400$	2.098	2	4.195
$x_4 = 6.200$	2.820	2	4.561
$x_5 = 7$	2.449	1	2.449

① $\int_a^b f(x)\,dx > T$

(2) $[0,3]$

x^3-6x+9

$1-6+9$

$8-12+9$

$27-18+9$

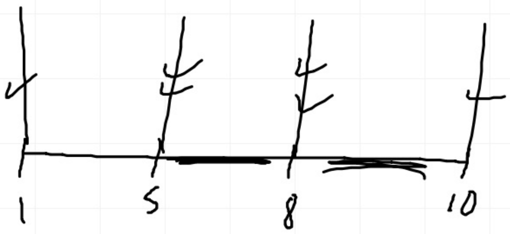
$\frac{1}{2}(13)(1)$

$\frac{1}{2}(9)(1)$

$\frac{1}{2}(23)(1)$

$\frac{13}{2}+\frac{9}{2}+\frac{23}{2}=\frac{45}{2}.$

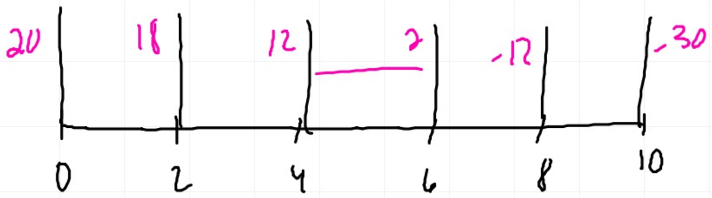
③



$\frac{1}{2}(\quad\quad)4$

$\frac{1}{2}(\quad\quad)3$

$\frac{1}{2}(\quad\quad)2$



$\frac{1}{\cancel{2}}(38)\cancel{2}$

$\frac{1}{\cancel{2}}(30)\cancel{2}$

$\frac{1}{\cancel{2}}(14)\cancel{2}$

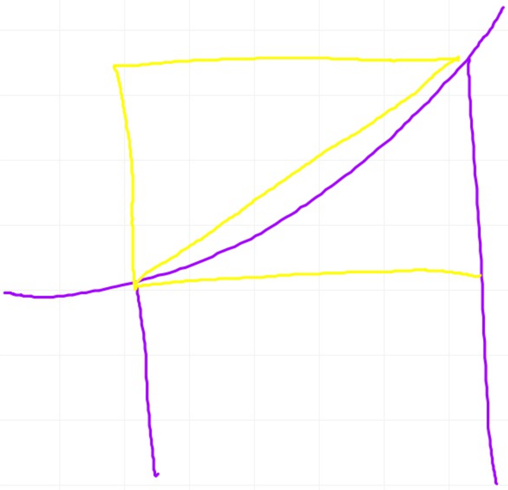
$\frac{1}{\cancel{2}}(-10)\cancel{2}$

$\frac{1}{\cancel{2}}(-42)(\cancel{2})$

$$I = \int_a^b f(x)\,dx \qquad f' > 0 \quad f'' > 0$$

L left RS, R right RS, T trap app

put L R T I in order small → largest



$$\boxed{L < I < T < R}$$

27 MC no cal 55

18 MC cal 50

A.
B.
C.
D.
E.

30 MC no cal 60

15 MC calc 45

2 FR calc 30

4 FR no cal 60

A
B
C
D