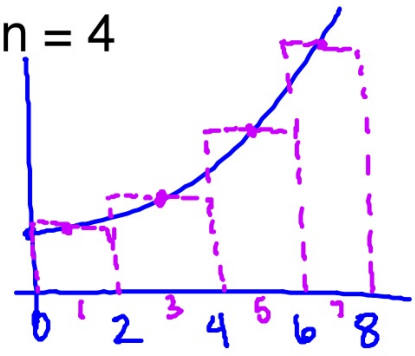
Midpoint Sums: Find the midpoints of the sub-intervals

$f(x) = x^2 + 1$ on the interval [0, 8] with n = 4

$$\int_0^8 f(x)\,dx \approx 2\left(f(1)+f(3)+f(5)+f(7)\right)$$

$$2(2+10+26+50)$$

$$\approx 176$$



Midpoint with a chart (3 sub-intervals)

x	0	4	8	12	16	20	24
$g(x)$	1	5	7	8	10	9	13

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

$$w = \frac{24-0}{3}$$

$$w = 8$$

$$\int_0^{24} g(x)\,dx \approx 8\left(g(4) + g(12) + g(20)\right)$$

$$8(5+8+9)$$

$$8(22)$$

$$176$$

Trapezoids: Approximating the area using trapezoids

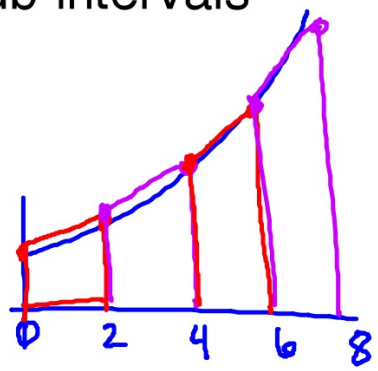
$f(x) = x^2 + 1$ on the interval [0, 8] with 4 sub-intervals

$$\int_0^8 f(x)\,dx \approx$$

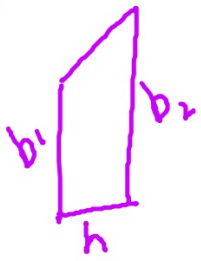
$$\frac{1}{2} \cdot 2\left(f(0)+f(2) + f(2)+f(4)+f(4)+f(6) + f(6)+f(8)\right)$$

$$1\left(1+5+5+17+17+37+37+65\right)$$

$$184$$



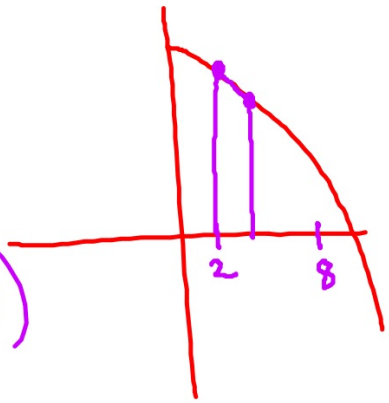
$$\frac{1}{2}h(b_1+b_2)$$



Trapezoid

$f(x) = -x^2 + 70$ $[2, 8]$ $n = 3$

$$\int_2^8 f(x)\,dx \approx \frac{1}{2}h\left(\_\_\_ + \_\_\_ + \_\_\_\right)$$



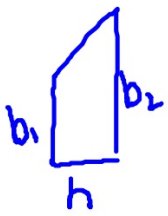
$$\frac{1}{2}(2)\left(f(2)+f(4)+f(4)+f(6)+f(6)+f(8)\right)$$

$$1(66+54+54+34+34+6)$$

$$248$$

Trapezoids with a chart (3 sub-intervals)

x	1	3	7	9
$g(x)$	5	8	4	3



$\frac{1}{2}h(b_1+b_2)$

$$\int_1^9 g(x)\,dx \approx \frac{1}{2}\left(2(5+8) + 4(8+4) + 2(4+3)\right)$$

$$\frac{1}{2}(26+48+14)$$

$$44$$

Trapezoids ($n = 3$)

x	1	4	6	10
$h(x)$	3	5	7	8

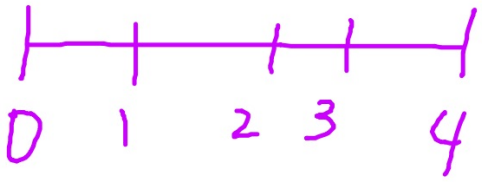
6 cd
7 cd
10
12
13
14

$$\int_1^{10} h(x)\,dx \approx \frac{1}{2}\left(3(3+5) + 2(5+7) + 4(7+8)\right)$$

54

$f(x) = 2x^2 + 1 \quad [0, 4] \quad n = 4$

$$\int_0^4 (2x^2 + 1)\,dx \approx$$



$$1\left[f\left(\tfrac{1}{2}\right) + f\left(\tfrac{3}{2}\right) + f\left(\tfrac{5}{2}\right) + f\left(\tfrac{7}{2}\right)\right]$$