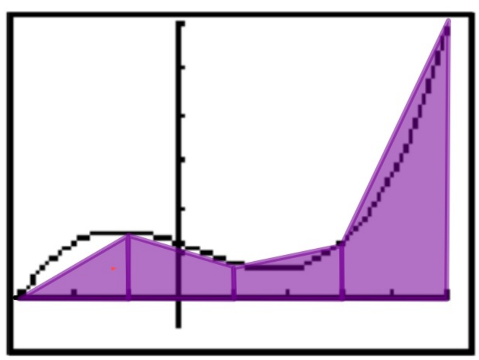
October 17

SWBAT:

Approximate area under a curve using the trapezoid rule



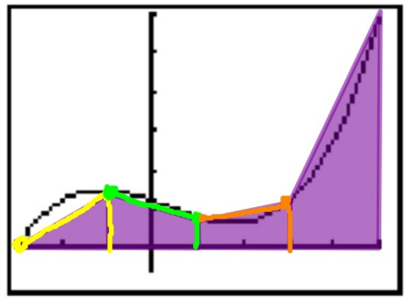
Int	x-val	y-val	width	Area
$-3\to-1$	-1	$7\frac{1}{3}$	2	$14\frac{2}{3}$
$-1\to1$	1	4	2	8
$1\to3$	3	6	2	12
$3\to5$	5	$29\frac{1}{3}$	2	$58\frac{2}{3}$
				93.333

34.667

$$\text{Averge} = \frac{34.667 + 93.333}{2}$$

$$= 64$$

$$f(x)=\frac{x^3}{3}-\frac{x^2}{3}-2x+6$$



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

Int.	$Y_1=(b_1)$	$Y_2=b_2$	width	Area
$-3\to-1$	0	7.333	2	$\frac{1}{2}(0+7.333)(2)=7.333$
$-1\to1$	7.333	4	2	11.333
$1\to3$	4	6	2	10
$3\to5$	6	29.333	2	35.333
			Total Area	64

Trapezoid Rule

When you have even intervals...

$$A_T\approx\frac{LRAM+RRAM}{2}$$

-or-

$$A_T\approx\frac{1}{2}(h)(y_1+2y_2+2y_3+\cdots+2y_{n-1}+y_n)$$

width

Over-estimate when the function is concave up ∪

under-estimate when the function is concave down ∩

Use 4 trapezoids of equal width to approximate $\int_1^3 x^2+6\,dx$

Int.	Y_1	Y_2	width	Area
1→1.5	7	+ 8.25	.5	3.813
1.5→2	8.25	+ 10	.5	4.563
2→2.5	10	+ 12.25	.5	5.563
2.5→3	12.25	+ 15	.5	6.813
			Total Area	20.752

$$A \approx \frac{1}{2}\left(\frac{1}{2}\right)\left(7+2(8.25)+2(10)+2(12.25)+15\right)$$

X	Y
-3	7
0	29
1	6
4	2
9	8

use 4 traps to approx $\int_{-3}^{9} f(x)\,dx$

Int	Y_1	Y_2	width	
-3→0	7	+ 29	3	54
0→1	29	+ 6	1	17.5
1→4	6	+ 2	3	12
4→9	2	+ 8	5	25
			Total Area	108.5

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(trapezoid rule only)