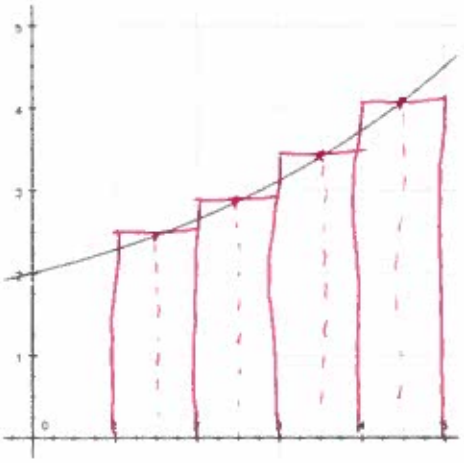
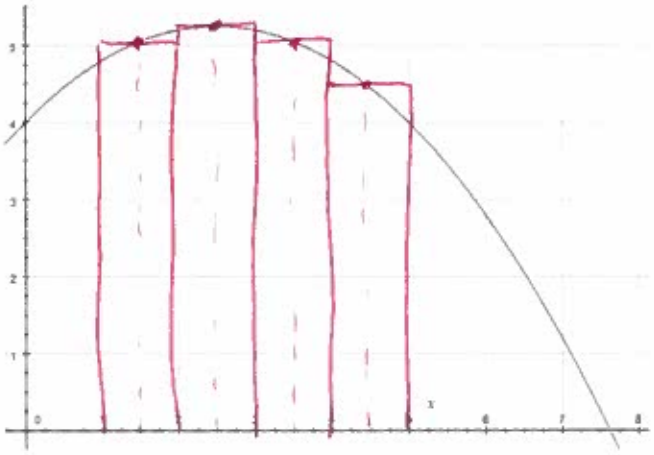
Whose name goes here? Key

AP Calculus AB: 7.3 Midpoint Rule

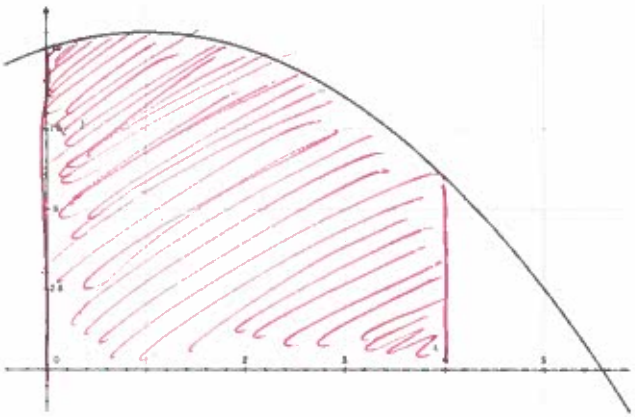
1. Draw a midpoint approximation for the estimate of the integral of the functions below for the intervals [1,5] using 4 rectangles.





2. Approximate the area under the curve for the function $f(x) = -0.5x^2 + x + 10$ for the interval [0,4].

a) Shade in the integral of the function $f(x)$ for the interval [0,4].



b) using 4 rectangles estimate the area of the function f(x) using the midpoint rule.
(Ans: 37.5)

$b = \frac{4-0}{4} = 1$

$A = 1[f(.5) + f(1.5) + f(2.5) + f(3.5)]$

$= [10.375 + 10.375 + 9.375 + 7.375]$

$= \boxed{37.5}$

c) using 8 rectangles estimate the integral of the area above using midpoint rule.
(Ans: 37.375)

$b = \frac{4-0}{8} = .5$

$A = .5[f(.25) + f(.75) + f(1.25) + f(1.75) + f(2.25) + f(2.75) + f(3.25) + f(3.75)]$

$= \boxed{37.375}$

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3. Approximate the area under the curve for the function $f(x)=\sqrt{x}+4$ using the methods below for the interval [3,7].

$b=\frac{7-3}{4}=1$

a) using 4 rectangles

midpoint *(Ans: 24.887)*

$A=1[f(3.5)+f(4.5)+f(5.5)+f(6.5)]$

$=24.887$

right-hand *(Ans: 25.331)*

$A=1[f(7)+f(6)+f(5)+f(4)]$

$=25.331$

$b=\frac{7-3}{8}=.5$

b) using 8 rectangles find the approximation with midpoint. *(Ans: 24.884)*

$A=.5[f(3.25)+f(3.75)+f(4.25)+f(4.75)+f(5.25)+f(5.75)+f(6.25)+f(6.75)]$

$=24.884$

4. Approximate the integral of the function below using the midpoint rule with 3 rectangles on the interval [2,14] *(Ans: 268)*

$\frac{14-2}{3}=4$

x	2	4	6	8	10	12	14
f(x)	13	23	45	31	20	13	9

$A=4[f(4)+f(8)+f(12)]$

$4[23+31+13]=268$

b) using the table above estimate the area between the x-axis and the function over the interval [4,12] using the midpoint rule and 2 rectangles. *(Ans: 260)*

$b=\frac{12-4}{2}=\frac{8}{2}=4$

$A=4[f(6)+f(10)]=4[45+20]=260$

5. Estimate the area under the curve of the function g(x) using the table below with the left-hand rule and 4 rectangles. *(Ans: 65)*

x	0	2	3	6	7
g(x)	2	12	13	10	8

unequal bases.

$A=(2)(2)+(1)(12)+(3)(13)+(1)(10)=65$