Rie-nam(e): Key

AP Calculus AB: 7.5 Riemann Practice

1. Write out the formulas for the Riemann Sums of the function h(x) for the interval [2,4] with 4 rectangles for each of the methods below.

$B = \frac{4-2}{4} = .5$

a) Left-hand Rule

$.5[h(2)+h(2.5)+h(3)+h(3.5)]$

b) Right-hand Rule

$.5[h(4)+h(3.5)+h(3)+h(2.5)]$

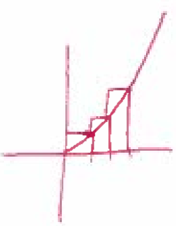
c) Midpoint Rule

$.5[h(2.25)+h(2.75)+h(3.25)+h(3.75)]$

d) Trapezoid Rule

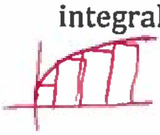
$\frac{.5}{2}[h(2)+2h(2.5)+2h(3)+2h(3.5)+h(4)]$

2. The function $f(x) = x^2$ is increasing whenever x>0. If you use right-hand rule to estimate the integral of $f(x)$ for the interval [3,15], would that be an over or under-estimate? Why?



over estimation

3. If you use left-hand rule to approximate the area under the curve of the function $g(x) = \ln(x) + 1$ for the interval [1,5] would you be over or under-estimating the integral? Why?



under estimation

4. Write out the formulas for the Riemann Sums of the function y(x) for the interval [0.5,1.7] with 6 rectangles for each of the methods below.

a) Left-hand Rule

$.2[f(.5)+f(.7)+f(.9)+f(1.1)+f(1.3)+f(1.5)]$

b) Right-hand Rule

$.2[f(1.7)+f(1.5)+f(1.3)+f(1.1)+f(.9)+f(.7)]$

c) Midpoint Rule

$.2[f(.6)+f(.8)+f(1)+f(1.2)+f(1.4)+f(1.6)]$

d) Trapezoid Rule

$\frac{.2}{2}[f(.5)+2f(.7)+2f(.9)+2f(1.1)+2f(1.3)+2f(1.5)+f(1.7)]$

5. Estimate the area under the curve of the function in the table below using right-hand rule for the interval [0,4] using 3 rectangles.

x	0	1	3	4
f(x)	5	7	9	12

unequal bases

$(1)(7) + (2)(9) + (1)(12) =$

$7 + 18 + 12 = \boxed{37}$

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6. Using the table below answer the questions underneath.

x	0	0.5	1	1.5	2	2.5	3
f(x)	2	3.125	4.5	6.125	8	10.125	12.5

a) Estimate the area under the curve of the function represented in the table for the interval [0,2] using the trapezoidal method of estimation with 4 trapezoids.

$B = \frac{2-0}{4} = .5$

$A = \frac{.5}{2}[f(0)+2f(.5)+2f(1)+2f(1.5)+f(2)]$

$.25[2+2(3.125)+2(4.5)+2(6.125)+8] = \boxed{9.375}$

b) Estimate the integral of the function shown in the table using the midpoint method of approximation for the interval [0,3] using 3 rectangles.

$B = \frac{3-0}{3} = 1$

$A = 1[f(.5)+f(1.5)+f(2.5)] = 1[3.125+6.125+10.125] = \boxed{19.375}$

c) Approximate the area under the curve of the function f(x) using the left-hand method of estimation for the interval [0,3] using 6 rectangles.

$B = \frac{3-0}{6} = .5$

$A = .5[f(0)+f(.5)+f(1)+f(1.5)+f(2)+f(2.5)]$

$= .5[2+3.125+4.5+6.125+8+10.125] = \boxed{16.938}$

d) Find the area under the curve of the function using the left-hand approximation for the interval [0,3] using 2 rectangles.

$B = \frac{3-0}{2} = 1.5$

$1.5[f(0)+f(1.5)] = 1.5[2+6.125] = \boxed{12.188}$

e) The derivative of the function shown in the table is $f'(x) = x + 2$ find the particular solution of the function $f(x)$.

$\int x+2 \, dx$

$\boxed{f(x) = \frac{x^2}{2} + 2x + 2}$

$f(x) = \frac{x^2}{2} + 2x + C$

$2 = \frac{0^2}{2} + 2(0) + C$

$2 = C$

f) Find $f(3)$.

$f(3) = \frac{(3)^2}{2} + 2(3) + 2 = \frac{9}{2} + 6 + 2 = \frac{9}{2} + \frac{12}{2} + \frac{4}{2} = \boxed{\frac{25}{2}}$