Sum Rectangles

SumRectangles.tns

Name ________________________

Class ________________________

Part 1 – Graphical Riemann Sums

1. For **f1**(x) = $-0.5x^2 + 40$, how do the left, midpoint, and right Riemann sums compare? Explain why.

2. Describe what happens to the left, midpoint, and right Riemann sums as you increase the number of subintervals, *n*.

3. Is the midpoint Riemann sum an over or under approximation if the graph is:

a. increasing and concave down? ____ over ______ under

b. increasing and concave up? ____ over ______ under

c. decreasing and concave down? ____ over ______ under

d. decreasing and concave up? ____ over ______ under

After graphically exploring (especially with a small number of subintervals), explain why.

Part 2 – Summation notation

1. The thickness of each rectangle is $\Delta x = h = \dfrac{b-a}{n}$. If *a* = 1, *b* = 6, and *n* = 5. What is Δx ?

2. Expand $\sum_{i=1}^{5}\left(1 \cdot \mathbf{f1}(a+(i-1)\cdot 1\right)$ by writing the sum of the five terms and substitute *i* = 1, 2, 3, 4, and 5.

3. Explain why this is the summation notation for LEFT Riemann sums and not the RIGHT.

4. Let **f1**(*x*) = $-0.5x^2 + 40$, *a* = 1, and *b* = 6. Write the sigma notation and use page 1.13 to evaluate the left Riemann sum for 10, 20, 50, and 100 subintervals.

a. *n* = 10

b. *n* = 20

c. *n* = 50

d. *n* = 100

Extension – Area Programs

1. Let **f1**(*x*) = x^2. Write the results for midpoint and trapezoid area approximations for

rsa(6,1,10) **rsa(6,1,100)** **rsa(6,1,500)**

2. Compare the above midpoint and trapezoid values with the actual area. Also explain what **rsa(b,a,n)** does.

