# Riemann Sums

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Created for: MATH 137
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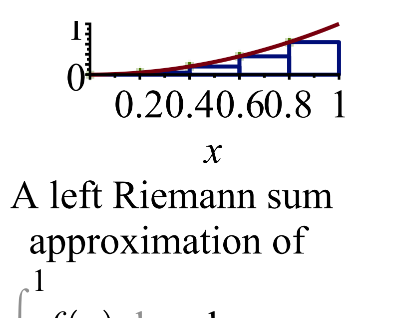
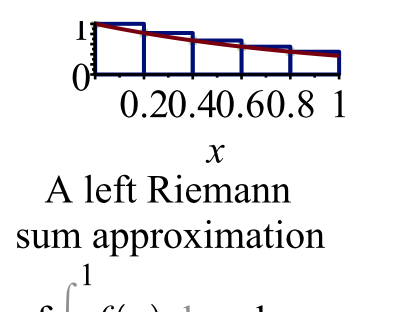
| Comments | Example 1 | Example 2 |
|---|---|---|
| Define the function, the interval in question ([a,b]) and the number of iterations, N. | $f := x \rightarrow x^2 :$<br>$a := 0 :$<br>$b := 1 :$<br>$N := 5 :$ | $g := x \rightarrow \exp(-x) :$<br>$a := 0 :$<br>$b := 1 :$<br>$N := 5 :$ |
| We can use the built in package RiemannSum to do all the work for us. | $with(Student[Calculus1]) :$ | $with(Student[Calculus1]) :$ |
| Use RiemannSum to calculate the Riemann Sum using the left method.<br>In example 1, we look at the Riemann Sums for the simple parabola. | $RiemannSum(f(x), x = a..b, output = plot, partition = N, method = left)$<br> | $RiemannSum(g(x), x = a..b, output = plot, partition = N, method = left)$<br> |
| Repeat the same process, this time using the right method. | $RiemannSum(f(x), x = a..b, output = plot, partition = N, method = right)$ | $RiemannSum(g(x), x = a..b, output = plot, partition = N, method = right)$ |

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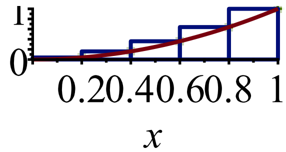
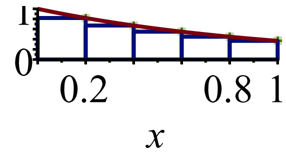
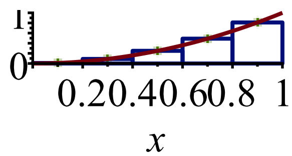
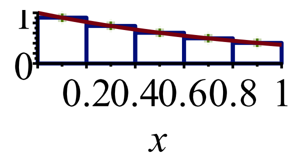
| | <br><br>A right Riemann sum approximation | <br><br>A right Riemann sum approximation |
| And finally, using the midpoint method. | $RiemannSum(f(x), x = a..b, output = plot, partition = N, method = midpoint)$<br><br><br>A midpoint Riemann sum approximation of | $RiemannSum(g(x), x = a..b, output = plot, partition = N, method = midpoint)$<br><br><br>A midpoint Riemann sum approximation of |