Area under a Curve



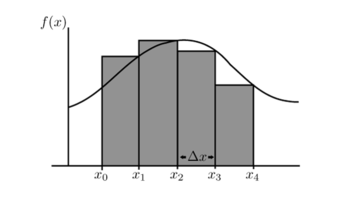
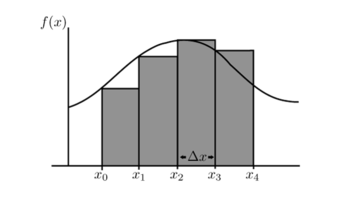
 f= integrand, a= upper bound, b= lower bound

 n= # of rectangles

Estimating Area

Let’s say we wanted to approximate the area under the curve y= f(x)from [0,4] using 4 rectangles.

Left end points Right end points (Riemann Sum)

L₄= underestimate (left corner) R₄=overestimate (right corners)

Example: Approximate the area under f(x)=2-x² from [0,2] using 4 rectangles

 L₄=.5[f(0)+f(.5)+f(1)+f(1.5)]

x₀=0, x₁=.5, x₂=1, x₃=1.5, x₄=2 sum(seq(function,x,start,end,∆x))=2.25

Midpoint rule:

Use the midpoint of each rectangle as the area where the equation passes through.

Example: , n=4

x₀=1, x₁=1.25, x₂=1.5, x₃=1.75, x₄=2

Midpoints= 1.125, 1.375, 1.625, 1.875

(.25)[f(1.125)+f(1.375)+f(1.625)+f(1.875)]

Trapezoid Rule:

A=.5h(b₁+b₂)

Example: , n=4, ∆x=.25

x₀=1, x₁=1.25, x₂=1.5, x₃=1.75, x₄=2

