1 6.3: The Definite Integral

Note that, although we assumed f was positive to illustrate the approximating rectangles, the definition can still be calculated even if f is not always positive.

The Definite Integral of f from $x = a$ to $x = b$ is given by

If $f > 0$, $\int_a^b f(x)\,dx$ gives us the area under the graph of f from $x = a$ to $x = b$.

Equally Spaced Partitions: Let n be the number of equally-spaced subintervals of $[a, b]$.

Then $\Delta x_i =$

and $\int_a^b f(x)\,dx =$

Properties of Definite Integrals (pp 383-385)

(NOTE: Some of the more useful properties for future sections are #2, 3, 5, and 8)

Given $f(x) = x^2 - 3x + 1$, find the exact value of $\int_0^3 f(x)\,dx$ from the definition.

Rewrite $\int_{-2}^{5} f(x)\,dx - \int_{3}^{5} f(x)\,dx + \int_{3}^{7} f(x)\,dx$ as a single integral.

On Your Own: Compute $\int_{0}^{4} \left(|x-3| + \sqrt{16-x^2} \right)\, dx$
(HINT: Use properties to split up, then remember that integral = area since both functions are positive on $[0,4]$)

$5 + 4\pi$