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 $[0, 4]$)