Area Between Curves

- Find the area between $y = f(x)$ and $y = g(x)$.
- Approximate the area by covering it with rectangles.
- The more rectangles, the better the approximation.
- An integral is the limit of these approximations as the number of rectangles approach infinity.

$$A = \int_a^b f(x) - g(x) \, dx = \lim_{n \to \infty} \sum_{i=1}^{n} A_i$$
Warmup: Areas of Rectangles

What is the area of the following rectangle?

\[ A = (6 - 2) \, dx = 4 \, dx \]
Find area by integrating along the $x$-axis.

- Draw a typical slice.
- Label the typical slice.
- Find area of typical slice.

\[
\begin{align*}
\text{width} & = dx \\
\text{height} & = f(x) - g(x) \\
\text{dA} & = (f(x) - g(x)) \, dx
\end{align*}
\]

- Use an integral to sum up the areas of the slices.

\[
A = \int_{x=a}^{x=b} dA = \int_a^b (f(x) - g(x)) \, dx
\]