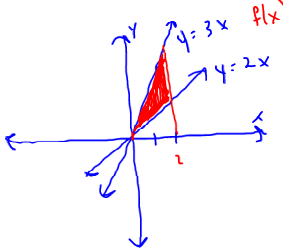
Definite Integrals (cont'd)

values of y on f(x) are larger than values of y on g(x)

For the case where $f(x) > g(x)$ between a and b, the area A of the region bounded by the graphs of $y = f(x)$ and $y = g(x)$ and the lines $x = a$ and $x = b$:

$$A = \int_a^b [f(x) - g(x)]\,dx$$

ex.1 Find the area between $y = 2x$ and $y = 3x$ from $x = 0$ to $x = 2$



f(x) because values of y are larger

$$A = \int_a^b [f(x) - g(x)]\,dx$$

$$= \int_0^2 [3x - 2x]\,dx$$

simplify before integrating

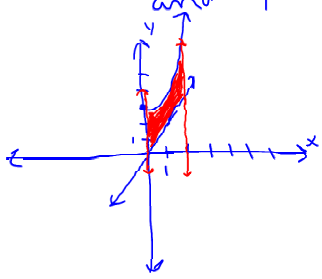
$$= \int_0^2 x\,dx$$

$$= \left[\frac{x^2}{2}\right]_0^2$$

$$= \frac{2^2}{2} - \frac{0^2}{2}$$

$$= 2\ u^2$$

ex.2 Find the area bounded by the graphs of $y = 3x^2 + 3$ and $y = 2x$ and the lines $x = 0$ and $x = 2$



* don't need a sketch but sometimes helpful to choose f(x)

$$A = \int_0^2 [3x^2 + 3 - 2x]\,dx$$

$$A = \left[x^3 - x^2 + 3x\right]_0^2$$

$$A = 2^3 - 2^2 + 3(2) - (0^3 - 0^2 + 3(0))$$

$$A = 10\ u^2$$