

Indefinite Integral.

$$\int 12x^5 dx = \frac{12x^6}{6} + C$$

$$\begin{aligned}\int (x^2 + 5x^4) dx &= \frac{x^3}{3} + \frac{5x^5}{5} + C \\ &= \frac{x^3}{3} + x^5 + C\end{aligned}$$

$$\begin{aligned}\int (3x^2 - 2x + 5) dx &= \frac{3x^3}{3} - \frac{2x^2}{2} + 5x + C \\ &= x^3 - x^2 + 5x + C\end{aligned}$$

$$\begin{aligned}\int (9x^2 + 4x + 3) dx &= \frac{9x^3}{3} + \frac{4x^2}{2} + 3x + C \\ &= 3x^3 + 2x^2 + 3x + C\end{aligned}$$

Definite Integral

Find the area under the graph

$$y = x + 2x^2$$

for x between 0 and 2.

$$\int_0^2 (x + 2x^2) \, dx = \left[\frac{x^2}{2} + 2 \frac{x^3}{3} \right]_0^2$$

$$= \left(\frac{2^2}{2} + 2 \frac{(2)^3}{3} \right) - \left(\frac{0^2}{2} + 2 \frac{(0)^3}{3} \right)$$

$$= \frac{4}{2} + \frac{16}{3} - (0)$$

$$= \frac{12}{6} + \frac{82}{6} = \frac{44}{6} \text{ sq units.}$$