Antidifferentian (shmoo) is also known as
indefinite integration and is denoted with the
symbol $\int dx$

$\underline{Ex}$ $\int x^2 dx = \frac{1}{3}x^3 + C$

" the antiderivative of f with respect to x "
or " the integral of f with respect to x "

variable
of
integration

$$\int f(x)\, dx = F(x) + C$$

integrand

constant
of
integration

Integration Rules

Power Rule

$$\int x^n dx = \frac{1}{n+1} x^{n+1} + C \; ; \quad n \neq -1$$

Constant Rule

$$\int K dx = Kx + C$$

Constant Multiple Rule

$$\int K f(x) dx = K \int f(x) dx$$

Sum or Difference Rule

$$\int (f(x) \pm g(x)) dx = \int f(x) dx \pm \int g(x) dx$$

Ex) a) $\int x^6 dx = \frac{1}{7} x^7 + C$

b) $\int 4 dt = 4t + C$

c) $\int 3 x^5 dx = 3 \int x^5 dx = 3 \left(\frac{1}{6} x^6 \right) + C$
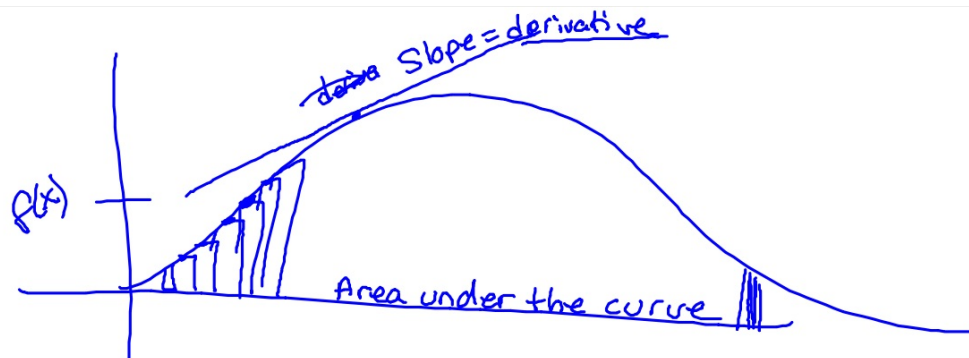$$= \frac{1}{2} x^6 + C$$

d) $\int (3u^4 + 6u^2 + 2) du$
$$= \int 3u^4 du + \int 6u^2 du + \int 2 du$$
$$= 3 \int u^4 du + 6 \int u^2 du + \int 2 du$$
$$= 3 \left(\frac{1}{5} u^5 \right) + 6 \left(\frac{1}{3} u^3 \right) + 2u + C$$
$$= \frac{3}{5} u^5 + 2u^3 + 2u + C$$

Slope = derivative

$f(x)$

Area under the curve

$$\sum_{i=1}^{n} f(x_i) dx$$

$$\int \underbrace{-(x^2 - 8)^2 + 5}_{\text{height}} \underbrace{dx}_{\text{width}}$$

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1-11 odd a.c.,
a.c. p3,5
i,3,5

e) $\int (x + \sqrt[3]{x}) dx = \int x \, dx + \int x^{\frac{1}{3}} dx$

$$= \frac{1}{2}x^2 + \frac{3}{4}x^{\frac{4}{3}} + C$$

Finding C

$s(t) = t^2 + t + C$

$v(t) = 2t + 1$

what was the position at time $t = 6$ sec?
we're given that the position is 1 m.

$1 = (6)^2 + 6 + C$

$1 = 36 + 6 + C$

$1 = 42 + C$

$-41 = C$

$s(t) = t^2 + t - 41$