Indefinite Integral (Review)

$$\int \underbrace{f(x)}dx = F(x) + c, c \in \mathbb{R}$$

Constant of Integration

Integrand

Variable of integration
(with respect to)

Definite Integral

Upper Limit → b

Lower Limit → a

$$\int_a^b \underbrace{f(x)}dx = \left[F(x)\right]_a^b = F(b) - F(a)$$

Integrand

Variable of integration
(with respect to)

Definite Integral Examples:

1.) $\displaystyle\int_{1}^{4} 2x \cdot dx = \left[x^2 + c \right]_{1}^{4} = (16 + c) - (1 + c) = \boxed{15}$

2.) $\displaystyle\int_{1}^{e} \frac{1}{x} + 4 \cdot dx = \left[\ln|x| + 4x \right]_{1}^{e} = (1 + 4e) - (4) = \boxed{4e - 3}$

3.) $\displaystyle\int_{0}^{\pi} \sin x \cdot dx = \left[-\cos x \right]_{0}^{\pi} = (1) - (-1) = \boxed{2}$

Definite Integral Examples (Cont.)

4.) $\displaystyle\int_{-1}^{0} x^2 + 4x + 2 \cdot dx = \left[\frac{1}{3}x^3 + 2x^2 + 2x \right]_{-1}^{0} = \boxed{\frac{1}{3}}$

5.) $\displaystyle\int_{2}^{5} \frac{1}{3 - 2x} \cdot dx = \left[-\frac{1}{2} \ln|3 - 2x| \right]_{2}^{5} = \boxed{-\frac{1}{2}\ln 7}$