Indefinite Integration Formulas

1. $\int k\,dx = kx + C$

2. $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C,\ n \neq -1$

3. $\int k\,f(x)\,dx = k\int f(x)\,dx$

4. $\int \big(f(x) \pm g(x)\big)dx = \int f(x)\,dx \pm \int g(x)\,dx$

5. $\int e^x\,dx = e^x + C$

6. $\int x^{-1}\,dx = \int \frac{1}{x}\,dx = \ln|x| + C$

7. $\int e^{ax}\,dx = \frac{1}{a}e^{ax} + C, \quad a \neq 0$

Indefinite Integration Formulas

1. $\int k\,du = ku + C$

2. $\int u^n\,du = \frac{u^{n+1}}{n+1} + C,\ n \neq -1$

3. $\int k\,f(u)\,du = k\int f(u)\,du$

4. $\int \big(f(u) \pm g(u)\big)du = \int f(u)\,du \pm \int g(u)\,du$

5. $\int e^u\,du = e^u + C$

6. $\int u^{-1}\,du = \int \frac{1}{u}\,du = \ln|u| + C$

7. $\int e^{au}\,du = \frac{1}{a}e^{au} + C, \quad a \neq 0$

DEFINITE INTEGRAL PROPERTIES

1. $\int_a^a f(x)\,dx = 0$

2. $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

3. $\int_a^b k\,f(x)\,dx = k\int_a^b f(x)\,dx$, *k a constant.*

4. $\int_a^b \left[f(x) \pm g(x)\right]dx = \int_a^b f(x)\,dx \pm \int_a^b g(x)\,dx$

5. $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$

FUNDAMENTAL THEOREM OF CALCULUS

If f is a continuous function on the closed interval [a, b] and F is any antiderivative of f, then

$$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$$

$$where \quad F'(x) = f(x)$$

Average Value Of A Continuous Function f Over $[a, b]$

$$\text{Average Value} = \frac{1}{b-a}\int_a^b f(x)\,dx$$