Antiderivatives

- To prove F(x) is antiderivative of f(x) $\Rightarrow$ F′(x) = f(x).
- $\int f(x)dx = F(x) + C$
- $\int f'(x)dx = f(x) + C$
- $\int u^n du = \frac{u^{n+1}}{n+1} + C$
- $\int \frac{du}{u} = \ln|u| + C$
- $\int \frac{1}{ax+b} dx = \frac{1}{a} \ln|ax + b| + C$
- $\int e^{ax+b}\, dx = \frac{1}{a} e^{ax+b} + C$
- Integration by parts: $\int udv = u.v - \int vdu$
- Area between (C_f) and (C_g) from x = a

  to x = b: A = $\int_a^b |f(x) - g(x)|\, dx\; u^2$.
- Volume = V= $\int_a^b \pi\, (f(x))^2\, dx\;\; u^3$
- Cos^2 x = $\frac{1+\cos 2x}{2}$
- $\sin^2$ x = $\frac{1-\cos 2x}{2}$
- $\int \cos ax\, dx = \frac{1}{a}\, \sin ax + C$
- $\int \sin ax\, dx = -\frac{1}{a}\, \cos ax + C$

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Let $f(x)$ and $g(x)$ be two continuous functions defined on $\mathbb{R}$.

A, B, and C are real constants.

n is a natural number.

$$\int A\cdot f(x)\cdot dx = A\cdot\int f(x)\cdot dx$$

$$\int [A\cdot f(x)\pm B\cdot g(x)]\cdot dx = \int A\cdot f(x)\cdot dx \pm \int B\cdot g(x)\cdot dx$$

$$\int (Ax+B)^n\cdot dx = \frac{(Ax+B)^{n+1}}{A\cdot(n+1)} + C \qquad (n\neq -1\,, A\neq 0)$$

$$\int_A^A f(x)\cdot dx = 0$$

$$\int_A^B f(x)\cdot dx = -\int_B^A f(x)\cdot dx$$

$$\int_A^B f(x)\cdot dx + \int_B^C f(x)\cdot dx = \int_A^C f(x)\cdot dx$$