

Properties of the Integral Operator

Let C and k be constants.

Properties:

- $\int F'(x) dx = F(x) + C.$
- $\frac{d}{dx} \left(\int f(x) dx \right) = f(x).$
- $\int k \cdot f(x) dx = k \int f(x) dx \quad k \in \mathbb{R}.$
- $\int f(x) + g(x) dx = \int f(x) dx + \int g(x) dx.$

Table of Integrals

Let f and g be integrable functions; C and k real constants and $a > 0, a \neq 1 \in \mathbb{R}$.

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

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

$$3. \quad \int \frac{f'}{f} \, dx = \ln |f| + C$$

$$4. \quad \int f' a^f \, dx = \frac{a^f}{\ln(a)} + C$$

$$5. \quad \int f' \cos(f) \, dx = \sin(f) + C$$

$$6. \quad \int f' \sin(f) \, dx = -\cos(f) + C$$

$$7. \quad \int f' \operatorname{tg}(f) \, dx = \ln |\sec(f)| + C$$

$$8. \quad \int f' \operatorname{cotg}(f) \, dx = \ln |\operatorname{cosec}(f)| + C$$

$$9. \quad \int f' \sec^2(f) \, dx = \operatorname{tg}(f) + C$$

$$10. \quad \int f' \operatorname{cosec}^2(f) \, dx = -\operatorname{cotg}(f) + C$$

$$11. \quad \int f' \sec(f) \, dx = \ln |\sec(f) + \operatorname{tg}(f)| + C, \quad \sec(f) + \operatorname{tg}(f) \neq 0$$

$$12. \quad \int f' \operatorname{cosec}(f) \, dx = \ln |\operatorname{cosec}(f) - \operatorname{cotg}(f)| + C, \\ \operatorname{cosec}(f) - \operatorname{cotg}(f) \neq 0$$

$$13. \quad \int f' \sec(f) \operatorname{tg}(f) \, dx = \sec(f) + C$$

$$14. \quad \int f' \operatorname{cosec}(f) \operatorname{cotg}(f) \, dx = -\operatorname{cosec}(f) + C$$

$$15. \quad \int \frac{f'}{a^2 + f^2} \, dx = \frac{1}{a} \operatorname{arctg}\left(\frac{f}{a}\right) + C$$

$$16. \quad \int \frac{f'}{\sqrt{1-f^2}} \, dx = \arcsin(f) + C$$