

Indefinite Integration Formulas

Indefinite Integration

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

$$2. \int \frac{1}{x} dx = \log^e x + C$$

$$3. \int a^x dx = \frac{a^x}{\log_e a} + C; \quad a \neq 1, a > 0$$

$$4. \int e^x dx = e^x + C$$

$$5. \int \sin x dx = -\cos x + C$$

$$6. \int \cos x dx = \sin x + C$$

$$7. \int \tan x dx = \ln |\sec x| + C$$

$$8. \int \cot x dx = \ln |\sin x| + C$$

$$9. \int \sec x dx = \ln |\sec x + \tan x| + C = \ln \left| \tan \left(\frac{\pi}{4} + \frac{x}{2} \right) \right| + C$$

$$10. \int \operatorname{cosec} x dx = \ln |\operatorname{cosec} x - \cot x| + C = \ln \left| \tan \frac{x}{2} \right| + C$$

$$11. \int \sec x \tan x dx = \sec x + C$$

$$12. \int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x + C$$

$$13. \int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a} + C = -\cos^{-1} \frac{x}{a} + C$$

$$14. \int \frac{dx}{x\sqrt{x^2 - a^2}} = \frac{1}{a} \sec^{-1} \frac{x}{a} + C = -\frac{1}{a} \operatorname{cosec} \frac{x}{a} + C$$

$$15. \int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + C = -\cot^{-1} \frac{x}{a} + C$$

$$16. \int \frac{dx}{a^2 - x^2} = \frac{1}{2a} \ln \left| \frac{a+x}{a-x} \right| + C = \frac{1}{a} \tanh^{-1} \frac{x}{a} + C$$

$$17. \int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \ln \left| \frac{x-a}{x+a} \right| + C = -\frac{1}{a} \coth^{-1} \frac{x}{a} + C$$

$$18. \int \frac{dx}{\sqrt{x^2 - a^2}} = \ln |x + \sqrt{x^2 - a^2}| + C = \cosh^{-1} \frac{x}{a} + C$$

$$19. \int \frac{dx}{\sqrt{x^2 + a^2}} = \ln |x + \sqrt{x^2 + a^2}| + C = \sinh^{-1} \frac{x}{a} + C$$

$$20. \int \sqrt{a^2 - x^2} dx = \frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \frac{x}{a} + C$$

$$21. \int \sqrt{a^2 + x^2} dx = \frac{x}{2} \sqrt{a^2 + x^2} + \frac{a^2}{2} \ln |x + \sqrt{a^2 + x^2}| + C$$

$$22. \int \sqrt{x^2 - a^2} dx = \frac{x}{2} \sqrt{x^2 - a^2} - \frac{a^2}{2} \ln |x + \sqrt{x^2 - a^2}| + C$$

$$23. \int \sinh x dx = \cosh x + C$$

$$24. \int \cosh x dx = \sinh x + C$$

$$25. \int \operatorname{sech}^2 x dx = \tanh x + C$$

$$26. \int \operatorname{cosech}^2 x dx = -\coth x + C$$

$$27. \int \operatorname{sech} x \tanh x dx = \operatorname{sech} x + C$$

$$28. \int \operatorname{cosech} x \coth x dx = -\operatorname{cosech} x + C$$

$$29. \text{ If } \int f(x) dx = \phi(x) \text{ then } \int f(ax + b) dx = \frac{1}{a} \phi(ax + b) + C$$

$$30. \int \underbrace{f(x)}_I \cdot \underbrace{g(x)}_II dx = f(x) \int g(x) dx - \int \left[\frac{d}{dx} f(x) \int g(x) dx \right] dx + C$$

$$31. \int e^x \{f(x) + f'(x)\} dx = f(x)e^x + C$$

$$32. \int e^{ax} \sin(bx + c) dx = \frac{e^{ax}}{a^2 + b^2} \{a \sin(bx + c) - b \cos(bx + c)\} + K$$

$$33. \int e^{ax} \cos(bx + c) dx = \frac{e^{ax}}{a^2 + b^2} \{a \cos(bx + c) + b \sin(bx + c)\} + K$$

$$34. \int \ln x dx = x \ln x - x + C$$

$$35. \int \frac{a \cos x + b \sin x}{c \cos x + d \sin x} dx = \frac{ac + bd}{c^2 + d^2} x + \frac{ad - bc}{c^2 + d^2} \ln |c \cos x + d \sin x| + K$$

$$36. \int \sin^n x dx = \frac{-\cos x \cdot \sin^{n-1} x}{n} + \frac{n-1}{n} \int \sin^{n-2} x dx$$

$$37. \int \cos^n x dx = \frac{-\sin x \cdot \cos^{n-1} x}{n} + \frac{n-1}{n} \int \cos^{n-2} x dx$$

$$38. \int \tan^n x dx = \frac{\tan^{n-1} x}{n-1} - \int \tan^{n-2} x dx; \quad n \neq 1$$

$$39. \int \cot^n x dx = \frac{-\cot^{n-1} x}{n-1} - \int \cot^{n-2} x dx; \quad n \neq 1$$

$$40. \int \sec^n x dx = \frac{\sec^{n-2} x \tan x}{n-1} + \frac{n-2}{n-1} \int \sec^{n-2} x dx; \quad n \neq 1$$

$$41. \int \operatorname{cosec}^n x dx = \frac{\operatorname{cosec}^{n-2} x \cot x}{n-1} + \frac{n-2}{n-1} \int \operatorname{cosec}^{n-2} x dx; \quad n \neq 1$$

$$42. \int \sin^{-1} ax dx = x \sin^{-1} ax + \frac{1}{a} \sqrt{1 - a^2 x^2} + C$$

$$43. \int \cos^{-1} ax dx = x \cos^{-1} ax - \frac{1}{a} \sqrt{1 - a^2 x^2} + C$$

$$44. \int \tan^{-1} ax dx = x \tan^{-1} ax - \frac{1}{2a} \ln |1 + a^2 x^2| + C$$

$$45. \int \frac{x^2}{\sqrt{a^2 - x^2}} dx = \frac{a^2}{2} \sin^{-1} \frac{x}{a} - \frac{x}{2} \sqrt{a^2 - x^2} + C$$

$$46. \int \frac{x^2}{\sqrt{a^2 + x^2}} dx = \frac{a^2}{2} \ln |x + \sqrt{a^2 + x^2}| + \frac{x}{2} \sqrt{a^2 + x^2} + C$$

$$47. \int \frac{\sqrt{a^2 - x^2}}{x^2} dx = \sin^{-1} \frac{x}{a} - \frac{\sqrt{a^2 - x^2}}{x} + C$$

$$48. \int \frac{\sqrt{a^2 + x^2}}{x^2} dx = \ln |x + \sqrt{a^2 + x^2}| - \frac{\sqrt{a^2 + x^2}}{x} + C$$

$$49. \int \frac{\sqrt{a^2 + x^2}}{x} dx = \sqrt{a^2 + x^2} - a \ln \left| \frac{a + \sqrt{a^2 + x^2}}{x} \right| + C$$

$$50. \int \frac{\sqrt{a^2 - x^2}}{x} dx = \sqrt{a^2 - x^2} - a \ln \left| \frac{a + \sqrt{a^2 - x^2}}{x} \right| + C$$

$$51. \int \frac{\sqrt{x^2 + a^2}}{x} dx = \sqrt{x^2 + a^2} - a \sec^{-1} \left| \frac{x}{a} \right| + C$$

$$52. \int \frac{dx}{x \sqrt{ax - b}} = \frac{2}{\sqrt{b}} \tan^{-1} \sqrt{\frac{ax - b}{b}} + C$$

$$53. \int \frac{dx}{x \sqrt{ax + b}} = \frac{1}{\sqrt{b}} \ln \left| \frac{\sqrt{ax + b} - \sqrt{b}}{\sqrt{ax + b} + \sqrt{b}} \right| + C$$

$$54. \int \frac{dx}{x \sqrt{a^2 + x^2}} = \frac{1}{a} \ln \left| \frac{a + \sqrt{a^2 + x^2}}{x} \right| + C$$

$$55. \int \frac{dx}{x^2 \sqrt{a^2 + x^2}} = -\frac{\sqrt{a^2 + x^2}}{a^2 x} + C$$

$$56. \int \frac{dx}{x^2 \sqrt{a^2 - x^2}} = -\frac{\sqrt{a^2 - x^2}}{a^2 x} + C$$

$$57. \int \frac{dx}{x^2 \sqrt{x^2 - a^2}} = \frac{\sqrt{x^2 - a^2}}{a^2 x} + C$$

$$58. \int \frac{dx}{2ax - x^2} = \sin^{-1} \frac{x - a}{a} + C$$

