

Miscellaneous Formulae

1. Area of a trapezoid: $\left(\frac{h_1 + h_2}{2}\right)w$
2. Volume of a cylinder: $\pi r^2 h$
3. The arc length of curve $y = f(x)$ from $x = a$ to $x = b$ is $\int_a^b \sqrt{1 + [f'(x)]^2} dx$

Summation Formulae

4. $\sum_{i=1}^n c = cn$
5. $\sum_{i=1}^n i = \frac{n(n+1)}{2}$
6. $\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$
7. $\sum_{i=1}^n i^3 = \frac{n^2(n+1)^2}{4}$

Inverse Trigonometric Functions

8. $\frac{d}{dx}(\arcsin x) = \frac{1}{\sqrt{1-x^2}}$
9. $\frac{d}{dx}(\arccos x) = \frac{-1}{\sqrt{1-x^2}}$
10. $\frac{d}{dx}(\arctan x) = \frac{1}{1+x^2}$
11. $\frac{d}{dx}(\operatorname{arcsec} x) = \frac{1}{x\sqrt{x^2-1}}$
12. $\frac{d}{dx}(\operatorname{arccsc} x) = \frac{-1}{x\sqrt{x^2-1}}$
13. $\frac{d}{dx}(\operatorname{arccot} x) = \frac{-1}{1+x^2}$
14. $\int \frac{dx}{\sqrt{a^2-x^2}} = \arcsin\left(\frac{x}{a}\right) + C$
15. $\int \frac{dx}{a^2+x^2} = \frac{1}{a} \arctan\left(\frac{x}{a}\right) + C$
16. $\int \frac{dx}{x\sqrt{x^2-a^2}} = \frac{1}{a} \operatorname{arcsec}\left(\frac{x}{a}\right) + C$

Hyperbolic Functions

17. $\sinh x = \frac{e^x - e^{-x}}{2}$
18. $\cosh x = \frac{e^x + e^{-x}}{2}$
19. $\cosh^2 x - \sinh^2 x = 1$
20. $\frac{d}{dx}(\sinh x) = \cosh x$
21. $\frac{d}{dx}(\cosh x) = \sinh x$
22. $\frac{d}{dx}(\tanh x) = \operatorname{sech}^2 x$
23. $\frac{d}{dx}(\coth x) = -\operatorname{csch}^2 x$
24. $\frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sech} x \tanh x$
25. $\frac{d}{dx}(\operatorname{csch} x) = -\operatorname{csch} x \coth x$

Trigonometric Identities

26. $\sin^2 x + \cos^2 x = 1$
27. $1 + \tan^2 x = \sec^2 x$
28. $\sin^2 x = \frac{1 - \cos(2x)}{2}$
29. $\cos^2 x = \frac{1 + \cos(2x)}{2}$
30. $\sin(x+y) = \sin x \cos y + \cos x \sin y$
31. $\cos(x+y) = \cos x \cos y - \sin x \sin y$

Maclaurin Series

32. $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$
33. $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots$
34. $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \dots$
35. $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots, \quad |x| < 1$
36. $\ln(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots, \quad |x| < 1$
37. $\arctan(x) = x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \dots, \quad |x| < 1$