

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

## Inverse Trigonometric Functions

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

## Hyperbolic Functions

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

## Trigonometric Identities

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

## Maclaurin Series

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