Common Mathematical Subjects

Trigonometry

Identities

$$\cos^2(\theta) + sin^2(\theta) = 1$$

$$1 + \tan^2(\theta) = \sec^2(\theta)$$

$$1 + \cot^2(\theta) = \csc^2(\theta)$$

Addition Formulas

$$\cos(A + B) = \cos(A).\cos(B) - \sin(A).\sin(B)$$

$$\sin(A + B) = \sin(A).\cos(B) + \cos(A).\sin(B)$$

Double Angle Formulas

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)$$

$$\sin(2\theta) = 2\sin(\theta)\cos(\theta)$$

Half-Angle Formulas

$$\cos^2(\theta) = \frac{1 + \cos(2\theta)}{2}$$

$$\sin^2(\theta) = \frac{1 - \cos(2\theta)}{2}$$

Hyperbolic Function

$$\sinh(x) = \frac{\mathrm{e}^x - \mathrm{e}^{-x}}{2}$$

$$\cosh(x) = \frac{\mathrm{e}^x + \mathrm{e}^{-x}}{2}$$

$$\tanh(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{\mathrm{e}^x - \mathrm{e}^{-x}}{\mathrm{e}^x + \mathrm{e}^{-x}}$$

$$\coth(x) = \frac{\cosh(x)}{\sinh(x)} = \frac{\mathrm{e}^{x} + \mathrm{e}^{-x}}{\mathrm{e}^{x} - \mathrm{e}^{-x}}$$

$$\operatorname{sech}(\mathrm{x}) \frac{1}{\cosh(x)}$$

$$\operatorname{cosech}(\mathrm{x}) = \frac{1}{\sinh(x)}$$

Eular Formulas

$$\mathrm{e}^{ix} = \cos(x) + \mathrm{i}\sin(x)$$

$$\mathrm{e}^{-ix} = \cos(x) - \mathrm{i}\sin(x)$$

$$\sin(x) = \frac{\mathrm{e}^{ix} - \mathrm{e}^{-ix}}{2\mathrm{i}}$$

$$\cos(x) = \frac{\mathrm{e}^{ix} + \mathrm{e}^{-ix}}{2}$$

$$\tan(x) = \frac{1}{(i)} \frac{\mathrm{e}^{ix} - \mathrm{e}^{-ix}}{\mathrm{e}^{ix} + \mathrm{e}^{-ix}}$$

Limit

$$\lim_{x \to c} f(x) = L$$

$$and$$

$$\lim_{x \to c} g(x) = M$$

1. Summation Rule: $\lim_{x \to c}(f(x) + g(x)) = L + M$
2. Difference Rule: $\lim_{x \to c}(f(x) + g(x)) = L + M$
3. Product Rule: $\lim_{x \to c}(f(x).\, g(x)) = L.\, M$
4. Constant Multiplication Rule: $\lim_{x \to c} k.\, f(x) = k.\, L$
5. Quotient Rule: $\lim_{x \to c}(\frac{f(x)}{g(x)}) = \frac{L}{M}$