Hyperbolic Functions

Hyperbolic Functions

	Trigonometric identities	Hyperbolic identities
	$\cos\theta = \dfrac{e^{i\theta}+e^{-i\theta}}{2}$	$\cosh\theta = \dfrac{e^{\theta}+e^{-\theta}}{2} = \cos(i\theta)$
	$\sin\theta = \dfrac{e^{i\theta}-e^{-i\theta}}{2i}$	$\sinh\theta = \dfrac{e^{\theta}-e^{-\theta}}{2} = -i\sin(i\theta)$
	$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$	$\tanh\theta = \dfrac{\sinh\theta}{\cosh\theta}$
	$\sec\theta = \dfrac{1}{\cos\theta}$	$\operatorname{sech}\theta = \dfrac{1}{\cosh\theta}$
	$\csc\theta = \dfrac{1}{\sin\theta}$	$\operatorname{csch}\theta = \dfrac{1}{\sinh\theta}$
	$\cot\theta = \dfrac{1}{\tan\theta}$	$\coth\theta = \dfrac{1}{\tanh\theta}$

Hyperbolic Functions

	Trigonometric identities	Hyperbolic identities
	$\cos^2\theta + \sin^2\theta = 1$	$\cosh^2\theta - \sinh^2\theta = 1$
	$\sin(\theta_1 \pm \theta_2) = \sin\theta_1 \cos\theta_2 \pm \cos\theta_1 \sin\theta_2$	$\sinh(\theta_1 \pm \theta_2) = \sinh\theta_1 \cosh\theta_2 \pm \cosh\theta_1 \sinh\theta_2$
	$\cos(\theta_1 \pm \theta_2) = \cos\theta_1 \cos\theta_2 \mp \sin\theta_1 \sin\theta_2$	$\cosh(\theta_1 \pm \theta_2) = \cosh\theta_1 \cosh\theta_2 \pm \sinh\theta_1 \sinh\theta_2$
	$1 + \tan^2\theta = \sec^2\theta$	$1 - \tanh^2\theta = \operatorname{sech}^2\theta$

Osborn's rule: Any formula involving *sin* and *cos* has an analogous formula involving *sinh* and *cosh*, which is the same in every way except that the product of two *sine*s must be replaced by minus the product of two *sinh*s.

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