Definition.

We know that parametric co-ordinates of any point on the unit circle $x^2 + y^2 = 1$ is $(\cos\theta, \sin\theta)$; so that these functions are called circular functions and co-ordinates of any point on unit hyperbola $x^2 - y^2 = 1$ is $\left(\frac{e^\theta + e^{-\theta}}{2}, \frac{e^\theta - e^{-\theta}}{2}\right)$ i.e., $(\cosh\theta, \sinh\theta)$. It means that the relation which exists amongst $\cos\theta, \sin\theta$ and unit circle, that relation also exist amongst $\cosh\theta, \sinh\theta$ and unit hyperbola. Because of this reason these functions are called as Hyperbolic functions.

For any (real or complex) variable quantity x,

(1) $\sinh x = \frac{e^x - e^{-x}}{2}$ [Read as 'hyperbolic sine x']

(2) $\cosh x = \frac{e^x + e^{-x}}{2}$ [Read as 'hyperbolic cosine x']

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

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

(5) $\text{cosech} x = \frac{1}{\sinh x} = \frac{2}{e^x - e^{-x}}$

(6) $\sec \text{h}x = \frac{1}{\cosh x} = \frac{2}{e^x + e^{-x}}$

Note: $\sinh 0 = 0$, $\cosh 0 = 1$, $\tanh 0 = 0$