FP3

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1 Hyperbolic Functions

The hyperbolic functions are like the trigonometric functions but relating to hyperbola rather than circles

$$\sinh z = \frac{e^z - e^{-z}}{2}$$

$$\cosh z = \frac{e^z + e^{-z}}{2}$$

$$\tanh z = \frac{\sinh z}{\cosh z}$$

$$\mathrm{csch} z = \frac{1}{\sinh z}$$

$$\mathrm{sech} z = \frac{1}{\cosh z}$$

$$\coth z = \frac{1}{\tanh z}$$

These functions differentiate as you would expect;

$$\frac{\mathrm{d}}{\mathrm{d}z} \sinh z = \cosh z$$

$$\frac{\mathrm{d}}{\mathrm{d}z} \cosh z = \sinh z$$

$$\frac{\mathrm{d}}{\mathrm{d}z} \tanh z = \mathrm{sech}^2 z$$