

## 6.1) Introduction to hyperbolic functions

## Worked example

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

$$\operatorname{cosech} x =$$

## Your turn

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

$$\operatorname{sech} x = \frac{2}{e^x + e^{-x}}$$

## Worked example

Find to 2 decimal places, the values of:  
 $\sinh 2$

$\cosh 0$

$\tanh 1.8$

## Your turn

Find to 2 decimal places, the values of:  
 $\sinh 3$

**10.02**

$\cosh 1$

**1.54**

$\tanh 0.8$

**0.66**

## Worked example

Find the exact values of:

$$\sinh(\ln 3)$$

$$\cosh(\ln 2)$$

$$\tanh(\ln 5)$$

## Your turn

Find the exact values of:

$$\sinh(\ln 2)$$

$$\frac{3}{4}$$

$$\cosh(\ln 3)$$

$$\frac{5}{3}$$

$$\tanh(\ln 4)$$

$$\frac{15}{17}$$

## Worked example

Find, to two decimal places, the value of  $x$  for which

$$\cosh x = 3$$

## Your turn

Find, to two decimal places, the value of  $x$  for which

$$\sinh x = 5$$

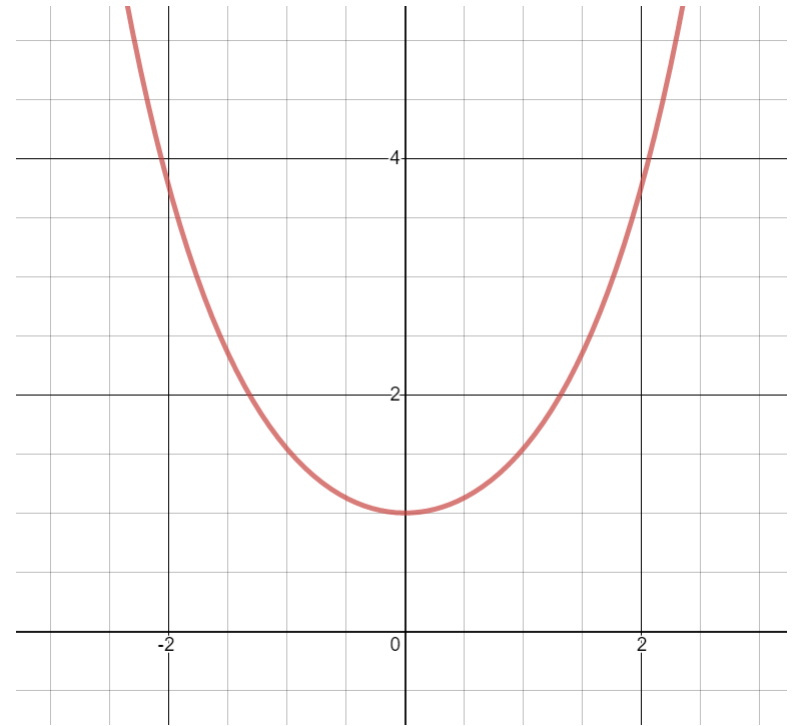
$$x = 2.31$$

## Worked example

Sketch the graph of  $y = \sinh x$  by using the exponential definition and state the range

## Your turn

Sketch the graph of  $y = \cosh x$ ,  $x \in \mathbb{R}$  by using the exponential definition and state the range



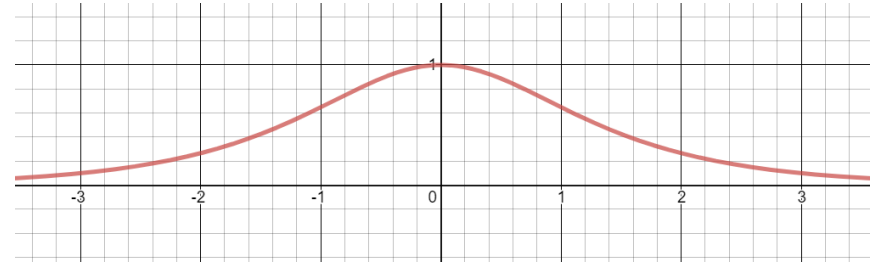
$$\cosh x \geq 1$$

## Worked example

By using the graph of  $y = \sinh x$ , sketch the graph of  $y = \operatorname{cosech} x$

## Your turn

By using the graph of  $y = \cosh x$ , Sketch the graph of  $y = \operatorname{sech} x$

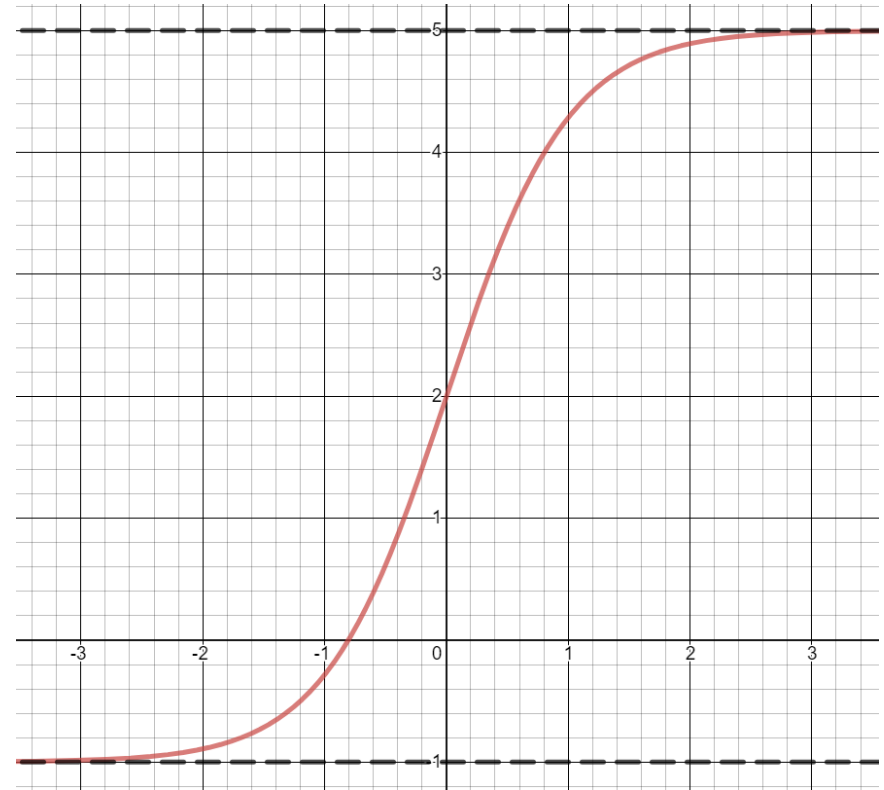


## Worked example

Sketch the graph of  $y = 2 \tanh x + 3$ , stating the asymptote equations of the curve

## Your turn

Sketch the graph of  $y = 3 \tanh x + 2$ , stating the asymptote equations of the curve



Asymptotes  $y = 5$  and  $y = -1$



## Worked example

On the same diagram sketch the graphs of  $y = \sinh 2x$  and  $y = 2 \sinh x$

## Your turn

On the same diagram sketch the graphs of  $y = \cosh 4x$  and  $y = 4 \cosh x$

