

Solutions

Each answer shows the steps, then the **result**.

2.1

- $\cosh 0 = \frac{1}{2}(1 + 1) = 1$

2.2

- $\sinh^{-1} 0 = \ln(0 + \sqrt{0 + 1}) = \ln 1 = 0$

3.1 B

- $\cosh^2 x - \sinh^2 x = 1$

3.2

- $\frac{e^x + e^{-x}}{2} = 3 \Rightarrow e^{2x} - 6e^x + 1 = 0; e^x = \frac{6 \pm \sqrt{32}}{2} = 3 \pm 2\sqrt{2}; x = \ln(3 \pm 2\sqrt{2})$

3.3

(a)

- let $y = \sinh^{-1} x$, so $x = \sinh y = \frac{1}{2}(e^y - e^{-y})$; $e^{2y} - 2xe^y - 1 = 0 \Rightarrow e^y = x + \sqrt{x^2 + 1}$ (positive root); $y = \ln(x + \sqrt{x^2 + 1})$

(b)

- $\sinh^{-1} \frac{3}{4} = \ln \left(\frac{3}{4} + \sqrt{\frac{9}{16} + 1} \right) = \ln \left(\frac{3}{4} + \frac{5}{4} \right) = \ln 2$