

$$2. (a) \tanh 0 = \frac{(e^0 - e^{-0})/2}{(e^0 + e^{-0})/2} = 0$$

$$(b) \tanh 1 = \frac{e^1 - e^{-1}}{e^1 + e^{-1}} = \frac{e^2 - 1}{e^2 + 1} \approx 0.76159$$

$$6. (a) \sinh 1 = \frac{1}{2}(e^1 - e^{-1}) \approx 1.17520$$

$$(b) \text{ Using Equation 3, we have } \sinh^{-1} 1 = \ln(1 + \sqrt{1^2 + 1}) = \ln(1 + \sqrt{2}) \approx 0.88137.$$

$$26. g(x) = \sinh^2 x \Rightarrow g'(x) = 2 \sinh x \cosh x$$

$$28. F(x) = \sinh x \tanh x \Rightarrow F'(x) = \sinh x \operatorname{sech}^2 x + \tanh x \cosh x$$

$$45. (a) y = A \sinh mx + B \cosh mx \Rightarrow y' = mA \cosh mx + mB \sinh mx \Rightarrow$$

$$y'' = m^2 A \sinh mx + m^2 B \cosh mx = m^2(A \sinh mx + B \cosh mx) = m^2 y$$

$$(b) \text{ From part (a), a solution of } y'' = 9y \text{ is } y(x) = A \sinh 3x + B \cosh 3x. \text{ So } -4 = y(0) = A \sinh 0 + B \cosh 0 = B, \text{ so}$$

$$B = -4. \text{ Now } y'(x) = 3A \cosh 3x - 12 \sinh 3x \Rightarrow 6 = y'(0) = 3A \Rightarrow A = 2, \text{ so } y = 2 \sinh 3x - 4 \cosh 3x.$$