

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

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

$$2-a) \tanh 0 = \frac{\sinh 0}{\cosh 0} = \frac{\frac{e^{(0)} - e^{-(0)}}{2}}{\frac{e^{(0)} + e^{-(0)}}{2}} = \frac{\frac{1-1}{2}}{\frac{1+1}{2}} = \frac{\frac{0}{2}}{\frac{2}{2}} = \underline{\underline{0}}$$

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

$$= \left(\frac{\frac{e}{1} - \frac{1}{e}}{\frac{e}{1} + \frac{1}{e}} \right) \left(\frac{\frac{e}{1}}{\frac{e}{1}} \right) = \frac{e^2 - 1}{e^2 + 1}$$

$$4-a) \sinh 4 = \frac{e^{(4)} - e^{-(4)}}{2} = \frac{e^4 - \frac{1}{e^4}}{2} = \frac{\frac{e^4}{1} \left(\frac{e^4}{e^4} \right) - \frac{1}{e^4}}{2}$$

$$= \frac{\frac{e^8}{e^4} - \frac{1}{e^4}}{2} = \frac{\frac{e^8 - 1}{e^4}}{2} = \underline{\underline{\frac{e^8 - 1}{2e^4}}}$$

$$4-b) \sinh (\ln 4) = \frac{e^{(\ln 4)} - e^{-(\ln 4)}}{2} = \frac{e^{(\ln 4)} - \frac{1}{e^{(\ln 4)}}}{2}$$

$$= \frac{4 - \frac{1}{4}}{2} = \frac{\frac{16}{4} - \frac{1}{4}}{2} = \frac{\frac{16-1}{4}}{2} = \frac{\frac{15}{4}}{2} = \underline{\underline{\frac{15}{8}}}$$

$$36) f(x) = e^x \cosh x$$

$$\begin{aligned} \frac{df}{dx} &= (e^x) [\sinh x (1)] + (\cosh x) [e^x (1)] \\ &= e^x \sinh x + e^x \cosh x = \underline{\underline{e^x (\sinh x + \cosh x)}} \end{aligned}$$

$$38) g(x) = \sinh^2 x$$

$$\frac{dg}{dx} = [2 \sinh x (\cosh x (1))] = \underline{\underline{2 \sinh x \cosh x}}$$

$$40) F(t) = \ln(\sinh t)$$

$$\frac{dF}{dt} = \left[\frac{1}{\sinh t} (\cosh t (1)) \right] = \frac{\cosh t}{\sinh t} = \underline{\underline{\coth t}}$$

$$42) H(v) = e^{\tanh 2v}$$

$$\frac{dH}{dv} = \left[e^{\tanh 2v} (\operatorname{sech}^2 2v (2)) \right] = \underline{\underline{2 \operatorname{sech}^2 2v e^{\tanh 2v}}}$$

$$44) v = \operatorname{sech}(\tanh x)$$

$$\begin{aligned} \frac{dv}{dx} &= \left[-\operatorname{sech}(\tanh x) \tanh(\tanh x) (\operatorname{sech}^2 x (1)) \right] \\ &= \underline{\underline{-(\operatorname{sech}^2 x) \operatorname{sech}(\tanh x) \tanh(\tanh x)}} \end{aligned}$$

$$46) f(t) = \frac{1 + \sinh t}{1 - \sinh t}$$

$$\begin{aligned} \frac{df}{dt} &= \frac{(1 - \sinh t)[\cosh t(1)] - (1 + \sinh t)[\cosh t(1)]}{(1 - \sinh t)^2} \\ &= \frac{\cosh t - \sinh t \cosh t - \cosh t - \sinh t \cosh t}{(1 - \sinh t)^2} \\ &= \frac{-2 \sinh t \cosh t}{(1 - \sinh t)^2} \end{aligned}$$