3.

a) ① $\begin{cases} w(x=0,t)=0 & \Longleftrightarrow B_1 = -B_3 \\ \dfrac{\partial^2 w}{\partial x^2}(x=0,t)=0 & \Longleftrightarrow B_1 = B_3 \end{cases} \Bigg\} B_1 = B_3 = 0 \longrightarrow$ ①

b) ① $\begin{cases} \dfrac{\partial w}{\partial x}(x=l,t)=0 & \Longleftrightarrow B_2\, ch_{\lambda l} + B_4\, c_{\lambda l} = 0 \\ \dfrac{\partial^3 w}{\partial x^3}(x=l,t)=0 & \Longleftrightarrow B_2\, ch_{\lambda l} - B_4\, c_{\lambda l} = 0 \end{cases}$ ①

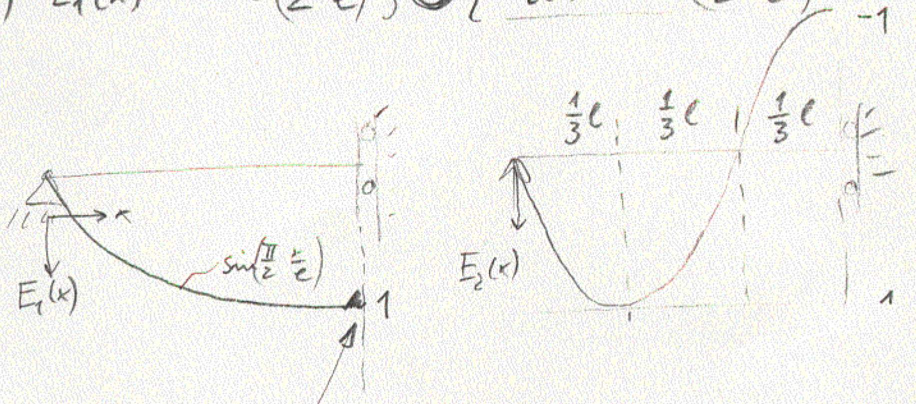
$$\begin{bmatrix} ch_{\lambda l} & c_{\lambda l} \\ ch_{\lambda l} & -c_{\lambda l} \end{bmatrix} \begin{bmatrix} B_2 \\ B_4 \end{bmatrix} = \underline{0}$$

$ch_{\lambda l} \cdot c_{\lambda l} = 0$ $\qquad \lambda_k l = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \ldots$ ①

c) $ch_{\lambda_k l}\, B_{2k} + c_{\lambda_k l}\, B_{4k} = 0 \quad (1)$ Für alle B_{4k} ist $c_{\lambda_k l} = 0$ ①
$\rightsquigarrow B_{4k}$ ist beliebig

Damit die Gleichung (1) gilt, muß sein $B_{2k} = 0$ ①

d) $E_1(x) = \sin\left(\frac{\pi}{2}\frac{x}{l}\right)$ ① $E_2(x) = \sin\left(\frac{3\pi}{2}\frac{x}{l}\right)$



horizontale Tangente

① falls ungefähr richtig

+① falls genau richtig