

## Exercise 7

Show that the eigenvalues of the eigenvalue problem

$$\begin{aligned}u_{tt} + c^2 u_{xxxx} &= 0, & 0 < x < \ell, t > 0, \\u(0, t) = 0 &= u(\ell, t) & \text{for } t \geq 0, \\u_x(0, t) = 0 &= u_x(\ell, t) & \text{for } t \geq 0,\end{aligned}$$

satisfy the equation

$$\cos(\lambda\ell) \cosh(\lambda\ell) = 1.$$