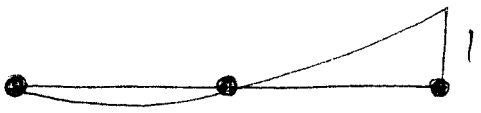
$$\boxed{N_2 = -\frac{4}{\ell^2}x^2 + 1}$$



$x = 0 \quad y = 0 \Rightarrow \quad c = 0$

$$\left.\begin{array}{l} x = -\frac{\ell}{2} \quad y = 0 \Rightarrow a\frac{\ell^2}{4} - b\frac{\ell}{2} = 0 \\ x = \frac{\ell}{2} \quad y = 1 \Rightarrow a\frac{\ell^2}{4} + b\frac{\ell}{2} = 1 \end{array}\right\} \quad a = \frac{2}{\ell^2}, \quad b = \frac{1}{\ell}$$

$$\boxed{N_3 = 2\frac{x^2}{\ell^2} + \frac{x}{\ell}}$$

The element stiffness matrix is given by:

$$[K_e] = \int_{-\frac{\ell}{2}}^{\ell/2} [B]^T [D] [B] \, A \, dx$$

where A is the cross-sectional area of the bar.