Exercise sheet #2: Energy method for elasticity

Question
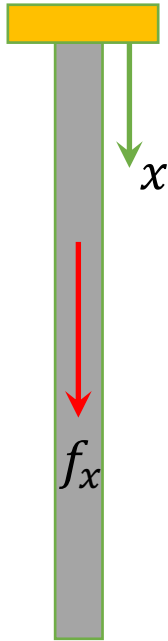
Solve the problem of a vertical hanging bar deforming elastically under its own weight using the method of elastic energy minimisation with the following quadratic shape function.

$$u(x) = a\left(\frac{x}{L}\right) + b\left(\frac{x}{L}\right)^2$$

where a and b are the degrees of freedom (DOF) to be determined.