

## Exercise 15

Find the equation for the eigenvalues  $\lambda$  of the problem

$$(\kappa(x)X')' + \lambda\rho(x)X = 0 \quad \text{for } 0 < x < l \text{ with } X(0) = X(l) = 0,$$

where  $\kappa(x) = \kappa_1^2$  for  $x < a$ ,  $\kappa(x) = \kappa_2^2$  for  $x > a$ ,  $\rho(x) = \rho_1^2$  for  $x < a$ , and  $\rho(x) = \rho_2^2$  for  $x > a$ . All these constants are positive and  $0 < a < l$ .