

## Exercise 4

Consider the Robin eigenvalue problem. If

$$a_0 < 0, \quad a_l < 0 \quad \text{and} \quad -a_0 - a_l < a_0 a_l l,$$

show that there are *two* negative eigenvalues. This case may be called “substantial absorption at both ends.” (*Hint:* Show that the rational curve  $y = -(a_0 + a_l)\gamma/(\gamma^2 + a_0 a_l)$  has a single maximum and crosses the line  $y = 1$  in two places. Deduce that it crosses the tanh curve in two places.)