Exercise 8

Consider again Robin BCs at both ends for arbitrary a_0 and a_l.

(a) In the $a_0 a_l$ plane sketch the hyperbola $a_0 + a_l = -a_0 a_l l$. Indicate the asymptotes. For (a_0, a_l) on this hyperbola, zero is an eigenvalue, according to Exercise 2(a).

(b) Show that the hyperbola separates the whole plane into three regions, depending on whether there are two, one, or no negative eigenvalues.

(c) Label the directions of increasing absorption and radiation on each axis. Label the point corresponding to Neumann BCs.

(d) Where in the plane do the Dirichlet BCs belong?