Section A. Quantum Mechanics

1. A particle of mass m, is moving on a line under the action of the Hamiltonian:

$$H_L \;=\; \frac{1}{2m}p^2 \;- b^2\left[\delta(x+L)+\;\delta(x-L)\right]$$

(whose potential features a pair of attracting delta functions).

   (a) State the symmetry, and sketch the shapes of the ground state and of the first excited bound state, in case such a state exists.

   (b) Determine the minimal L_0 such that for $L > L_0$ the Hamiltonian has more than one bound state.

   (c) What is the maximal number of bound states that H_L can have?