

Homework 4

Due by 10pm on Wednesday, September 30th, 2020

Reading: Schroeder Chap. 2, sections 2.4-6. Class notes.

1. A particle of mass m is free to move in one dimension. Denote its position coordinate by x and its momentum by p . Suppose that this particle is confined within a box between $x = 0$ and $x = L$, and suppose that its energy is known to lie between E and $E + \Delta E$. Draw the classical phase space of this particle, indicating the regions of this space which are accessible to the particle.
2. Consider a system of two weakly interacting particles, each of mass m and free to move in one dimension. Denote the respective position coordinates of the two particles by x_1 and x_2 , their respective momenta by p_1 and p_2 . Again these particles are confined in a box from $x = 0$ to $x = L$. The total energy of the system is known to lie between E and $E + \Delta E$. Since it is difficult to draw a four dimensional phase space, draw separately the part of the phase space involving x_1 and x_2 and that part involving p_1 and p_2 . Indicate on these diagrams the regions of phase space accessible to the system.
3. Schroeder 2.12 and 2.13
4. Schroeder 2.17
5. Schroeder 2.21
6. Schroeder 2.26