Physics 820 homework III, due Mon Sep 20

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Reading: Chapter 2

Problems:

1. Goldstein, Problem 1-10.

2. Two particles, characterized by charge q_1 and q_2, respectively, and by mass of m_1 and m_2, move under the influence of each other in an external uniform electric field $\vec{E}$. Examine the Lagrangian for the particles with external and mutual Coulomb potential terms and demonstrate that the particle motion may be studied by considering *separately* the motion of the center of mass and the motion in the particle relative separation.

3. Goldstein, Problem 1-16.

4. Goldstein, Problem 1-23.

5. Use the Lagrange's equations in combination with the Hamilton's principle to find the shortest curve joining two arbitrary points on a cylindrical surface of radius R. Note: You can select coordinates from the cylindrical system such that one of the points is located at $(0, 0)$ and the other at (ϕ_1, z_1).