

Physics 505 - Autumn 2010

HW I

Due 10/6/10

Overview: Recall that solving physics problems is not (just) about solving differential equations. Use physical reasoning to solve the following exercises and be certain to show your work.

- 1) Fetter & Walecka - 1.2
- 2) Fetter & Walecka - 1.7
- 3) Fetter & Walecka - 1.12
- 4) Fetter & Walecka - 1.13
- 5) No summary/review of undergraduate classical mechanics is complete without an inclined plane problem. So consider an inclined plane of mass M that rests on a rough floor with coefficient of static friction μ (the horizontal frictional force between the block with the inclined plane and the floor is less than or equal to μ times the normal force between the inclined plane and the floor). A mass m_1 is suspended by a (massless) string, which passes over a smooth (frictionless) peg at the upper end of the incline and attaches to a mass m_2 . The second mass slides on the inclined plane without friction and the incline makes an angle θ with the horizontal. The local acceleration due to gravity is g .
 - a) Solve for the accelerations of m_1 and m_2 and the tension in the string if μ is very large.
 - b) Find the smallest coefficient of friction μ for which the inclined plane remains at rest.