

PHYS 222 Classical Mechanics II (Spring 2019)
Homework #2, due Thursday Jan 31 in class

Hamiltonian mechanics.

1. Problem 7-24 in Marion.
2. Problem 7-25 in Marion.
3. Problem 7-33 in Marion.
4. Consider the Lagrangian of a particle of mass m and charge e in an electromagnetic field

$$L(\mathbf{r}, \dot{\mathbf{r}}, t) = \frac{1}{2}m\dot{\mathbf{r}}^2 - e\phi(\mathbf{r}, t) - \frac{e}{c}\dot{\mathbf{r}} \cdot \mathbf{A}(\mathbf{r}, t),$$

where ϕ and \mathbf{A} are scalar and vector potentials of the electromagnetic field. Find the canonical momentum, the Hamiltonian, and Hamilton's equations of motion.

5. Prove the Jacobi identity for the Poisson brackets:

$$\{a, \{b, c\}\} + \{b, \{c, a\}\} + \{c, \{a, b\}\} = 0$$