Math 658. Fall, 2014

Problem Set 2

1. Show that Hamilton’s equations may be written using the canonical Poisson bracket.

2. Show that the canonical Poisson bracket satisfies the Jacobi identity.

3. Show that the rigid body equations are variational with respect to the reduced variational principle discussed in class i.e. with respect to the variations

$$\delta \Omega = \dot{\Sigma} + \Omega \times \Sigma$$

4. 1.3-2 from text

5. Use Lagrange multipliers to write down the equations of motion for a particle on the 2-sphere.

6. Compute the Lie bracket for the control vector fields of the Heisenberg system discussed in class. Compute the distance travelled along the $z$-axis when a you traverse a unit square in the positive quadrant of $x - y$-plane with corner at the origin (in the anti-clockwise direction).

7. 2.2-1 from text

8. 2.2-2 from text.

9. 2.2-3 from text.