Homework Set #1 (due September 1)

1a) Find the Lagrangian of a particle moving on a circle.

1b) Derive the equations of motion.

2a) Derive the equations of motion for
   \[ L_1 = \frac{1}{2} \dot{q}^2 \quad \text{and} \quad L_2 = \frac{1}{2} \dot{q}^2 + q \dot{q} \]

2b) Explain why the equations of motion for \( L_1 \) and \( L_2 \) are the same.