Problem 1. Problem 1. Find the inertia tensor of a homogeneous sphere with respect to the center of mass.

Problem 2. Derive the equation of motion in a non-inertial frame of reference.

Problem 3. Compute the Ostrogradsky conjugate momenta and the Hamiltonian for the Pais-Uhlenbeck oscillator

$$L = \frac{1}{2}\left(\ddot{x}^2 - (\omega_1^2 + \omega_2^2)\dot{x}^2 + \omega_1^2\omega_2^2 x^2\right) \ ,$$

where ω_1 and ω_2 are constants.