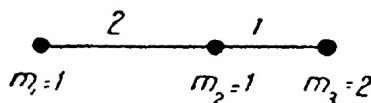


Problem 1. Find the inertia tensor of a homogeneous sphere with respect to the center of mass.

Problem 2. Find the principal moments of inertia for the system of points described in the figure.



Problem 3a. Define the Euler angles.

Problem 3b. Derive the equation of motion in a non-inertial frame of reference.

Problem 4. Compute the Ostrogradsky conjugate momenta and the Hamiltonian for the Pais-Uhlenbeck oscillator

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

where ω_1 and ω_2 are constants.

Problem 5. Write the condition between the L matrix (Lax pair) and the classical r -matrix that gives that the eigenvalues of L are in the involution.