

## Physics 235, Homework Set 10

**Write the following text on the front cover of your homework assignment and sign it. If the text is missing, 20 points will be subtracted from your homework grade.**

**Honor Pledge for Graded Assignments**

"I affirm that I have not given or received any unauthorized help on this assignment, and that this work is my own."

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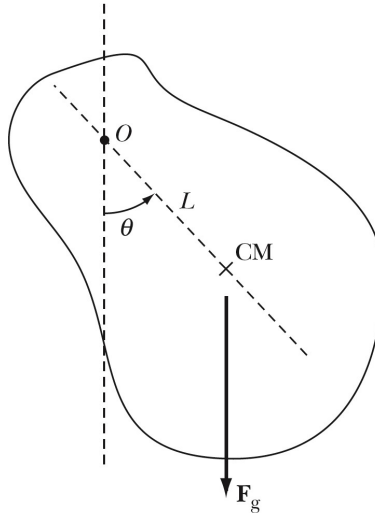
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Signature \_\_\_\_\_

1. Show that none of the principal moments of inertia can exceed the sum of the other two.
2. A uniform rod of length  $b$  stands vertically upright on a rough floor and then tips over. What is the rod's angular velocity when it hits the floor?
3. Find the frequency of small oscillations for a thin homogeneous plate if the motion takes place in the plane of the plate and if the plate has the shape of an equilateral triangle and is suspended
  - (a) from the midpoint of one side.
  - (b) from one apex.

4. A physical or compound pendulum is a rigid body that oscillates due to its own weight about a horizontal axis that does not pass through the center of mass of the body (see Figure).



Assume the pendulum of mass  $M$  is released from rest from an angle  $\theta_0$ . Determine the angular velocity  $\omega$  as function of the angle  $\theta$ . Note: do not assume that the angles are small.