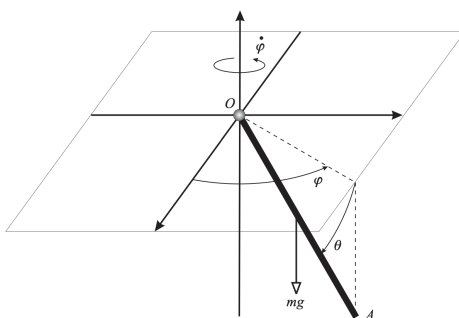


Tarea 8

Se entrega el Miércoles 19 de Noviembre

1. Show that for any solid the sum of any two principal moments of inertia is not less than the third. For what shapes is the sum of two equal to the third?
2. Calculate the moments of inertia of:
 - b) A uniform circular cone of mass M , height h and base radius R with respect to the principal axes whose origin is at the vertex of the cone.
 - a) A solid uniform cylinder of radius r , height $2h$ and mass M about its centre of mass. For what height-to-radius ratio does the cylinder spin like a sphere?
3. A straight homogeneous rod OA (length $2l$ and mass m) can rotate freely about the fixed end point O . Initially the rod is horizontal ($\theta = 0$) and rotates about the vertical direction through O with angular velocity $\dot{\phi} = \omega$. Under the influence of gravity it starts to rotate about a horizontal axis through O . Calculate $\dot{\phi}$ as a function of θ in the ensuing motion and calculate the turning points in the θ -motion.



4. A top consists of a disc of radius R and a straight light pole that constitutes the axis of the top. This axis passes through the fixed point O . The distance between O and the disc is L . The angle α between the axis and the vertical remains fixed. The plane that passes through the axis of the top and the vertical through O rotates with constant

angular velocity Ω about the vertical through O . Determine the angular velocity ω of the top relative to this plane.

