# PHY151H1F – Practice Problem Set 10

[Note: These three problems were taken from "Essential University Physics" Volume 1 (3rd Edition) by Richard Wolfson, ©2016 by Pearson Education, Inc. They cover similar material to the three problems from Mazur for Problem Set 10.]

Rotational Inertia Question Not From Mazur (Wolfson 10.65)

A disk of radius R has an initial mass M. Then a hole of radius $R/4$ is drilled, with its edge at the disk center
Find the new rotational inertia about the central axis. (*Hint*: Find the rotational inertia of the missing piece, and subtract it from that of the whole disk. You'll find the parallel-axis theorem helpful.)
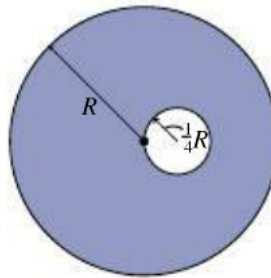
Torque Question Not From Mazur (Wolfson 10.52)

Each propeller on a King Air twin-engine airplane consists of three blades, each of mass 10 kg and length 125 cm. The blades may be treated approximately as uniform, thin rods. (a) What's the propeller's rotational inertia? (b) If the plane's engine develops a torque of 2.7 kN·m, how long will it take to spin up the propeller from 1400 rpm to 1900 rpm?

Mechanical Equilibrium Question Not From Mazur (Wolfson 12.21)

The figure shows how a scale with a capacity of only 250 N can be used to weigh a heavier person. The 3.4-kg board is 3.0 m long and has uniform density. It's free to pivot about the end farthest from the scale. Assume that the beam remains essentially horizontal. What's the weight of a person standing 1.2 m from the pivot end if the scale reads 210 N?