Core Problems.

Read the corresponding sections from the text and lecture notes. Use Maple to check your answers, or to facilitate your work. Then do the following problems.

In addition to lecture notes, read about the tangential and normal components of acceleration in Section 13, and the derivation of the Kepler’s First Law. Derivation of the Kepler’s First Law will not be on exams.

Section 13.4: 5, 13, 15, 17, 19, 23, 25, 27, 29, 37. Complete the steps (a) – (d) in the Applied Project on pages 848, 849. This will give you a proof of the Second Kepler’s Law.

Section 14.1: 7 – 19 (odds only), 30, 55 – 60.

Solutions of these problems should be submitted.

H6.1 Find an equation of a surface consisting of all points $P$ for which the distance from $P$ to the $x$-axis is twice the distance from $P$ to the $yz$-plane. Identify the surface.

H6.2 A rectangular box stands on horizontal floor. A ball rolls off a top of the box with a (horizontal) speed of 3 ft/s directed perpendicular to the edge. The box is 4 ft high.

(a) How far from the vertical wall of the box will the ball fall on the floor?
(b) What is the speed of the ball at the instant of impact?
(c) Find the angle between the trajectory of the ball and the vertical line drawn through the point of impact.
(d) Suppose the ball rebounds from the floor at the same angle with which it hits the floor, but looses 10% of its speed due to energy loss on impact. Where does the ball strike the floor on the second impact?