Warm-up problems to be done BEFORE recitation
Physics 271, December 7 and 8, 2017

Useful constants: $G = 6.67 \times 10^{-11}$ N m^2/kg^2
$R_{earth} = 6.37 \times 10^6$ m, $M_{earth} = 5.97 \times 10^{24}$ kg, $M_{sun} = 1.99 \times 10^{30}$ kg
Mean orbital radius of Earth $= 1.5 \times 10^{11}$ m
Mean orbital radius of Pluto $= 5.9 \times 10^{12}$ m
Review Kepler's Laws and quantities characterizing ellipses
(links on recitation web site)

•45   The Martian satellite Phobos travels in an approximately circular orbit of radius 9.4×10^6 m with a period of 7 h 39 min. Calculate the mass of Mars from this information.

•49   A comet that was seen in April 574 by Chinese astronomers on a day known by them as the Woo Woo day was spotted again in May 1994. Assume the time between observations is the period of the Woo Woo day comet and take its eccentricity as 0.11. What are (a) the semimajor axis of the comet's orbit and (b) its greatest distance from the Sun in terms of the mean orbital radius R_P of Pluto?

•51   SSM   A satellite, moving in an elliptical orbit, is 360 km above Earth's surface at its farthest point and 180 km above at its closest point. Calculate (a) the semimajor axis and (b) the eccentricity of the orbit.

•63   SSM   WWW   An asteroid, whose mass is 2.0×10^{-4} times the mass of Earth, revolves in a circular orbit around the Sun at a distance that is twice Earth's distance from the Sun. (a) Calculate the period of revolution of the asteroid in years. (b) What is the ratio of the kinetic energy of the asteroid to the kinetic energy of Earth?