Physics 112
Homework #1: Gravitation

Name: _____

Total value: 5 points. Homework due Thursday, September 6, 2001. Late Homework: half credit.

Draw an x-y coordinate system with the sun at the origin; ***Use graph paper!***
Make use of the following data:

$M_{Sun} = 3 \times 10^5 M_{Earth}$
$M_{Jupiter} = 300 M_{Earth}$
$M_{Saturn} = 100 M_{Earth}$

1. Put the Earth at position (A, 0) where A represents the distance from the Earth to the Sun. [Choose A to be a certain number of grid squares.] Draw a force vector at the position of the Earth that represents the magnitude and direction of the gravitational force acting on the Earth. ***Caution:*** You will need to plan this out so that all of #1-3 will fit on the same page.

2. On the same diagram, put Jupiter at the (–5A, 0) position. Draw a force vector at the position of Jupiter that represents the magnitude and direction of the net gravitational force acting on Jupiter.

3. On the same diagram, put Saturn at the (0, 10A) position. Draw a force vector at the position of Saturn that represents the magnitude and direction of the net gravitational force acting on Saturn.

4. Now assume that the Sun and Jupiter disappear. On a second diagram, draw a new set of force vectors representing the gravitational forces now acting on the Earth and Saturn.

   Assume that the Sun, Earth, and planets are "points," i.e. represent them all by dots, not by circles of various sizes.

   Length of force vector arrows should be proportional to the magnitudes of the forces. (That is, larger magnitude forces are represented by longer arrows.) In #4, you will need to use a different scale to represent force magnitudes than you used in #1-3; <u>Explain why.</u>

5. Homework exercises, Workbook Chapter 1; #1–6.