Instructions

This is the first lab for unit III, Game Physics, Motion and Perception.
You do not have to submit this lab. The purpose of this lab is to give you a chance to put into practice some basic "game physics" of motion. Note that "game physics" does not always match reality. But the second challenge problem (below) give you an opportunity to try and implement some real physics into a simple game.

Preparation

- Read the chapter entitled **Math and Physics Primer** (from *Programming Game AI by Example*, by Mat Buckland), which was handed out in class on Sep 21.
- If you never took physics (or you did but can't remember it) and/or you need some refreshing of your math knowledge, here are some on-line resources that you might find helpful:
    - http://www.physicsclassroom.com/Class/
    - http://www.physics-online.info/
    - http://www.math.com/
- Download the sample Processing code from:
  http://www.processing.org/learning/topics/bounce.html

1 Lab

1.1 Modify the Bounce code so that you have 2 balls bouncing.

1.2 Then modify your code to detect collisions between the two balls.
   Hint #1: use the bounding box of the ellipses to determine if the balls collide.
   Hint #2: if the balls collide, treat the collision in the same way that the code handles the balls hitting the "walls" (boundaries) of the arena—i.e., reverse the x and y directions.

2 Challenge Problem #1

2.1 Modify your code to emulate the "Pong" game, as follows. Draw a rectangle along one of the vertical edges of the display window. Allow the user to move the rectangle up and down, using the arrow keys. If the bouncing ball hits the rectangle, then it bounces off the rectangle (as if it is a ping-pong paddle); and the user gets a point. If the bouncing ball misses the rectangle, then it escapes out of the display window; and the computer gets a point.

3 Challenge Problem #2

3.1 Modify the Bounce code so that it uses acceleration due to gravity when the ball is falling. Note that you'll have to figure out how to adjust the acceleration (and velocity) after the ball hits the ground and bounces back up.