LSU EE 4702-1 Homework 1 Due: 15 September 2011

Problem 1: Follow the instruction on the `http://www.ece.lsu.edu/koppel/gpup/proc.html` page for account setup and programming homework work flow. Compile and run the homework code unmodified. It should show the ball bouncing on the tiled platform with some prisms made of syllabi, similar to the scene shown in class. *Promptly report any problems.*

Use the arrow keys to move around the scene. Look at the comments in the file `hw1.cc` for documentation on other keys. Try turning gravity on and off. *Note: There is nothing to turn in for this first problem.*

Problem 2: In the code as assigned, the velocity of the ball is determined only by the acceleration of gravity (except when it hits the platform). Modify the code in `time_step_cpu_v0` to account for air viscosity when computing ball velocity, using the variable `opt_air_viscosity` for a viscosity amount. If `opt_air_viscosity` is zero there is no air resistance. The value of `opt_air_viscosity` can be changed from the user interface. See comments in `hw1.cc` under the heading Keyboard Commands and subheading Variables.

Assume that due to air viscosity a force is applied to the ball that is proportional to the ball's velocity. An approximate solution would multiply the velocity by some simple factor determined by the viscosity. At least some students should work through the calculus to determine the correct change in velocity based on the duration of the time step.

Problem 3: Modify the code in `hw1.cc` so that it shows an arrangement of chairs. The code must be organized in the same way as the code showing the prism tower.

Add a routine named `new_chair` that constructs and returns a single chair, similar to `new_prism`. This routine should arrange cards to form a chair using transforms. That is, **do not** position the cards by setting members `upper_left`, etc. Using transforms is doing it the hard way and in this particular case would be less efficient than setting individual coordinates. However, the point of the assignment is to learn to use transforms.

Add a second routine that calls `new_chair` and returns an arrangement of chairs, as does `new_tower` for prisms. The routine might be called `new_theater`, `new_stadium`, `new_box`, `new_deck`, etc. A third routine might be added, for example, if you've already written routines `new_chair` and `new_deck` you might add a third routine `new_stadium` that calls `new_deck`.