Problem 0:   If necessary, follow the instructions on the
http://www.ece.lsu.edu/koppel/gpup/proc.html page for account setup and programming home-
work work flow. Compile and run the homework code unmodified. It should initially show a vaguely
umbrella-shaped object hanging in space.

The screenshot on the right
shows what the object should look
like after Problem 1 is solved cor-
rectly.

Press digits 1 through 2 to ini-
tialize different scenes, the program
starts with scene 2. Scene 1 shows a
balls connected in a rectangular spi-
ral. *Promptly report any problems.*

Use key h to toggle between
the first (head) ball being locked in
place and free. Use key t to do the
same for the last (tail) ball.

Initially the arrow keys, PageUp,
and PageDown can be used to move
around the scene. Press (lower-case)
b and then use the arrow and page
keys to move the first ball around.
Press l to move the light around
and e to move the eye (which is
what the arrow keys do when the
program starts).

Look at the comments in the file hw03.cc for documentation on other keys.

In the previous assignment, and in the demos given so far in class, the physical model consisted
of point masses connected by ideal springs, and these were rendered using spheres and cylinders.

This assignment code simulates a world that includes spheres that are connected either by
links attached to the sphere surface or ideal springs "attached" to the sphere center (as in the
prior homework). The links that connect to the sphere surface can apply linear force and torque,
and they can bend. In the physical model each link consists of two perfectly rigid pieces, one
end connected to the respective balls and the other end connected to each other by ideal springs
arranged in a circle. (The total length of the two rigid pieces serves as the relaxed distance of the
link itself.) The links bend around this connection.

Since a link can bend it would not make sense to render it as a cylinder. Instead they are
rendered as cubic Hermite curves. Consider a link that connects balls B_1 and B_2 with centers at
C_1 and C_2. Let P_1 and P_2 denote the coordinate where the link attaches to B_1 and B_2. The link is
rendered as a cubic Hermite curve parametrically described by $L(t) = (2t^3 - 3t^2 + 1)\overrightarrow{0P_1} + (-2t^3 +
3t^2)\overrightarrow{0P_2} + s(t^3 - 2t^2 + 1)\overrightarrow{C_1P_1} + s(t^3 - t^2)\overrightarrow{P_2C_2}$, where s is the stiffness of the links and is set to
$s = \|2.5\overrightarrow{P_1P_2}\|$ in the code.

In hw03.cc routine render_link_1 and render_link_2 render these new curved links as
triangle strips. The i loop moves along the curve, the value of $L(t)$ is assigned to variable ctr.
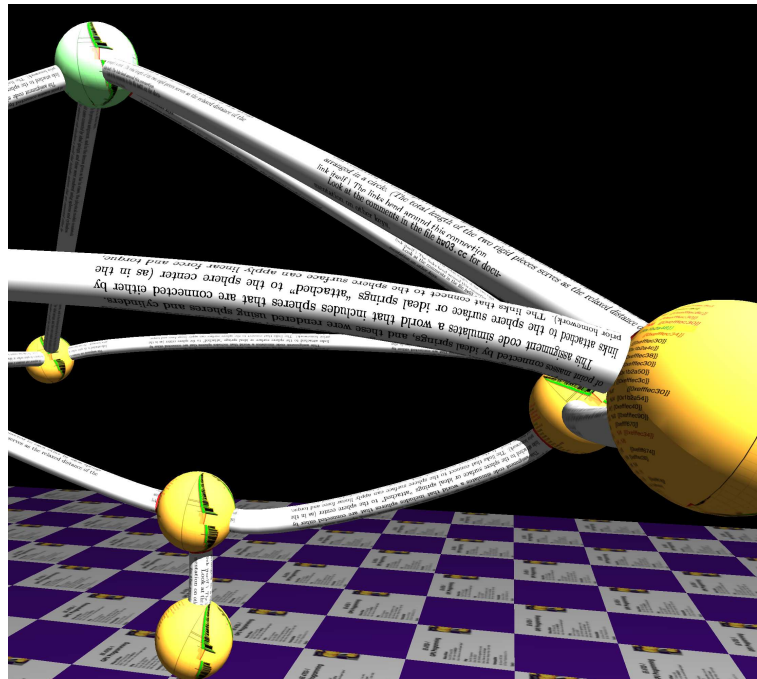
The derivative $\frac{dL(t)}{dt}$ gives the direction of the curve. That is assigned to `tan`. The `j` loop draws a cylinder (sort of) around the curve.

Problem 1: Modify `render_link_1` so that the link is textured. The texture unit and texture objects are already set up, all that needs to be done is to emit texture coordinates. The texture is an image of this assignment handout. Emit the texture coordinates so that text is along the links. **The size of the text should be constant in object space.** That is, long links (such as the ones that connect to the uppermost ball) should not have stretched-out text and short links (such as the vertical links, see the screenshot above) should not have compressed text. Pressing `v` will toggle between the ordinary view and one where triangles stand out. This may help in debugging.

Note: As originally assigned, Homework 3 had an additional problem. That problem is now part of Homework 4.