CIS 425/625 Fall 2014, Assignment 3
Due Tuesday, October 21, at midnight.
Instructions for submitting HW3.

A Helicoptor drops Paint Balloons

Time to build a helicopter. All it needs is some simple fuselage, it could be a sphere, and propellers. Extra, make it elaborate, decorate it,... Power your helicopter so the propeller turns. This will be done with the **idle** function. The P key will turn on and off the helicopter power.

You also need four objects on the ground. These could be simple 3D glut shapes, all different, or (extra) they could include a tree, a house, a squirrel,...

In advance you have made a flight plan. (extra) You could make this path visible/invisible with a stippled curve, by pressing the D key. When the F key is pressed, your helicopter takes flight, lifting into the air and flying over all four objects. As an extra, the helicopter will not jump from point to point, but will fly smoothly, going through points in between, making the flight look smoother. Another nice extra, the helicopter turns smoothly and always faces the direction it is moving. As it flies, for extra, you could show the helicopter's shadow. Other shadows? The flight uses a **timer** function. You can design it so it is not possible to stop the propellers while in flight, or, as an extra, what could happen if the props stop midflight?

If you click on the helicopter with the left mouse key, it drops a paint balloon. It could fall straight down, or (extra) you can incorporate physics. If the balloon hits one of the four objects on the ground, the object gets painted, turning color and changing from wire mode to filled in. Maybe it all changes at once, or (extra) maybe we see the colors spreading down the object. If the balloon hits the ground, it leaves a painted patch. You decide how many balloons the helicopter carries. When the helicopter finishes its flight plan, it lands, waiting to fly again. For extra there could be scoring and the score displayed.

It would be nice to be able to view all of this from different sides. Pressing 1, 2, 3, or 4 lets us view the scene from the North, the East, the South and the West repectively. All these views are in perspective, using glFrustum or gluPerspective. In all these views we should be able to see the helicopter and the four objects.

Pressing 0, we get a view from overhead, high enough to see the helicopter and the objects. This should be an orthographic view.   In this view, if the mouse rolls over one of the four objects, the object changes. Maybe it changes color or shape or puts up an umbrella or... - you decide. The change lasts till you roll over the object again, when it should change back. For extra, in this view, you can move an object by dragging it with the mouse. The flight path could change, too.

You do not need 2 windows, but you could (extra) have 2 viewports, displaying the scene from the side and from overhead simultaneously.

Pressing the R key, for reset, returns everything to the original setup.

Since sometimes it is nice to view what is going on slowly, and sometimes we want to see it quicker, please include a global constant SPEED that the user can set before running to speed up or slow down the action. Also, include the ability to increase, decrease speed using the up and down arrow keys.

Explore the glut solids, the more different ones you use, the merrier (now where should I put that teapot?) Remember they can be stretched in various ways, so a sphere can become a long leg, a cube can become a slab of wood.

This is a 3D assignment. Make good use of the depth buffer.

Since we have to test lots of programs, please stick with the keyboard and mouse commands as specified. Feel free to add additional ones of your choice, in additon.

F fly
P power on/off the propellers
left mouse click, drop a paint balloon.
passive mouse roll over item in 0 view, change something
1,2,3,4, 0 - change view
D- toggle view of path
R reset view
Up and down arrow, adjust speed

 (I have used red for extra and blue for buttons/mouse. If you cannot see these colors, let me know and I will make a version using different fonts.)