Assignment 2

CMSC 427, Spring 2009
Due 11:00am, Tuesday, March 10, 2009
Maximum Score: 10 points

This assignment is meant to familiarize you with OpenGL lighting, mouse input, camera control, understanding matrices, and shadow mapping.

Compiling:
Compilation and setup should be similar to the previous assignment. The project includes functions for loading a model in the OBJ format, and loading TGA textures. There is no Windows-specific code – you may need to add them as needed based on previous assignment. Altogether, the following include files are needed, along with the glu32 and glut32 libraries:

```
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <string.h>
#include <glut.h>
#include "glm.h"
#include "Texture.h"
```

Assignment Tasks (each of the four tasks is worth 2.5 points)
In this assignment, you are given a textured model of a bed. Please do the following:

1. Add a floor to the scene. The floor should simply be a large square that the bed is resting on. The floor in the sample executable is -3 to 3 in the x and y directions and 0.6 in the z direction.

2. Add lighting to the scene. Surface normals are already calculated for the model. HINT: lookup the following constants: `GL_AMBIENT, GL_DIFFUSE, GL_POSITION, GL_LIGHT1, GL_LIGHTING`

3. Add mouse interaction to the scene using GLUT.
   a. When the mouse is moved without pressing a button, the x and y coordinates of the camera should change.
   b. When the left mouse button is pressed and the mouse is dragged, the x and y coordinates of the light should change.

   HINT: look up `glutMotionFunc, glutPassiveMotionFunc`

4. Create a shadow of the bed on the floor, based on the location of the light. There are various ways to create shadows. Here is what is used in the sample executable:
   a. Move the camera to the location of the light. HINT: you need to use an orthographic camera rather than a perspective camera for this.
   b. Render the bed with a white background, and the bed model all black.
   c. Create a texture from this.
   d. Assign the texture to the floor plane. HINT:you will need to set up texture generation in your init() function. Look up: `glCopyTexImage2D, glTexEnvi, glTexParameteri,glTexGeni`

   Be careful about the texture coordinates of this shadow image on the floor plane. You will need to think about how projection matrices work to find these coordinates. HINT: look up these commands

```
glGetDoublev(GL_MODELVIEW_MATRIX, modelview);
glGetDoublev(GL_PROJECTION_MATRIX, projection);
glGetIntegerv(GL_VIEWPORT,viewport);
gluProject(…);
```

Please submit your modified load_model.cpp file. (If you create other files as well, please submit them together as a zip file.)