Objective: In this project, you will explore some geometric-modeling and texture-mapping issues. Drag out your GIS model and associated textures from Assignment #1. We will reuse them in this assignment. You are going to write a simple system for viewing high complexity models—in this case, terrain models.

Minimal requirements (worth 80%):
1) You must be able to render your entire elevation model with a registered texture map, recall that your model should be at least 1K x 1K points, which translates to nearly 2M triangles.
2) You should provide a “god’s eye” camera-view mode in which the terrain is manipulated using a trackball interface.
3) You should provide “cow’s eye” camera-view mode where a viewpoint is situated slightly off the terrain surface, with an up-vector in the direction of the face normal upon which the cow is located.
4) You should provide an indication of the cow’s and god’s eye viewing position. They should be visible from the “other” camera’s view.
5) You should provide the following navigation interface for the cow’s-eye camera.
   - The left and right arrow keys should rotate the view to the left and right about the vertical camera axis, in the indicated direction.
   - The up and down arrow keys should translate the cow forward and backward respectfully in the direct of its look vector, while maintaining a fixed distance from the surface.
   - You should also provide an interface to raise and lower the look-at direction of the cow using the “page-up” and page-down” keys
6) You must compute estimated normals for each vertex, and use them to shade the terrain surface. Shading can be implemented as a mode. In other words, you are allowed to turn off texturing if you when shading.
7) You must support multiple terrain model versions, and provide a user interface for selecting between them. The model modes must include:
   a. A variably decimated version of the original mesh. This is done by subsampling the data uniformly in both x and y. You should provide a slider to control the level of subsampling.
   b. A simplified version of the terrain model based on random half-edge collapses. The resulting model should be at least 1/16th the triangle complexity of the original terrain.
8) The cow must be able to perform an edge-flip of edge he is closest to. You can handle ties in any way you wish. The cow must remain a fixed distance from the resulting surface.
9) You must also provide bits of candy placed randomly on the map for the cow to find.

Extras (worth various amounts):
1) (10 pts) Provide a second simplified terrain model based that employs an optimization heuristic for selecting the half-edge collapses.
2) (5 pts) Allow the cow to leave a trace on the surface of his path. Allow for clearing of this path, as well as turning it on and off. Also provide for printing a measurement of the path’s length.
3) (5 pts) Provide a smooth transition of the cow’s up-vector based on interpolating the vertex normals.
4) (5 pts) Implement a visibility pruning approach which improves the rendering speed of the cow’s eye model (it should be significantly more than just back-face culling)
5) (5 pts) Create some number (> 1) robot cows that wander the surface randomly.
6) (5 pts) Create an autopilot mode for your cow so that it first orients itself, and then travels maximally downhill. Also, provide the same capability for uphill travel.
7) (5 pts) Vary the cow’s speed of translation depending on the z-component of the translation direction.
8) (5 pts) Provide a “tilt mode” for the cow so that it appears that he will not roll down hills upon which he walks sideways

Policies: Everyone must turn in their own assignment. You can collaborate with others, but any work that you turn in should be your own. Turn in your work by emailing an archived and compressed version of it (source and executable) to the instructor and TA.