CMPM 163 S2019
Game Graphics & Real-time Rendering

Homework 2 (100 pts) – Due Sunday, 5/13 at 11:59pm

All code will be uploaded to GitHub (or another repo), it should include a short “ReadMe” describing the project, along with one or more screenshots of the project. Assignments A, B, and C should either run from a website or have a clear link to the executable available via your GitHub repo’s ReadMe.

You are encouraged to help each other, but you must submit the homework individually to the TA of your lab— either Manu Mathew Thomas for Lab A (mthomas6@ucsc.edu) or David Abramov for Lab B and C (dabramov@ucsc.edu)— with “CMPM 163: Homework 2” as the subject line. Please use this exact subject line.

A. Tron Filter - (40 pts for completion + 10 pts for creativity)

Using HLSL shaders, create a simple scene that combines two shaders and that contains at least one complex mesh (representing a character or vehicle). The first shader is an “outline” shader or a “rim” shader that can be applied to the mesh to create a colored border where the normals on the mesh are near perpendicular to the vector pointing from the vertex to the camera. The second shader is a screen-space “bloom” filter (also called a “glow” filter or a “Tron” filter) that blurs and then brightens the scene, making the bright elements (e.g. your character’s outline) in the scene look like they are glowing.

Extra credit (20 pts):

Extend your scene so that your character is still visible when placed behind another object (i.e., create an “x-ray” camera.)

B. Outdoor 3D scene - (40 pts for completion + 10 pts for creativity)

Using Unity and HLSL shaders, create a scene with at least the following elements:

— A height map that is used to represent terrain. The height map can be created from an image, or procedurally (e.g., from a noise function or by some other method). Additionally, you will apply one or more textures to the terrain.

— A cube map, or “Sky Box”, that is used to represent the sky or distant objects.

— Bodies of water (e.g., where the height map is less than sea level) that reflect the sky.

— Include properties that control some parameters of the scene.

Extra credit (20 pts):

— In addition to having the water reflect the sky, also implement a Fresnel effect to refract the light so that we can also see objects or textures at the bottom of the bodies of water from particular view angles.