CMPM 163 W2018
Game Graphics & Real-time Rendering

Homework 2 (100 pts) – Due Sunday, 2/18 at 12noon

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 and B should run from a website. Lucas will provide the instructions for submitting the homework. This time around, 10% of your grade will based on creativity. You can also earn a total of 10 points of extra credit.

A. **Outdoor 3D scene** - (45 pts for completion and 5 pts for creativity)

Using Three.js and GLSL 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 (eg, from a noise function or some other method). Additionally, you will apply one or more textures to the terrain.

— A cube map that is used to represent the sky or distant objects.

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

— Be able to move the camera through the scene.

— Use dat.gui to control some parameters of the scene.

Extra credit (5 pts):

— In addition to having the water reflect the sky, also use a Fresnel effect to refract the light so that we can also see the bottom of the bodies of water.

B. **Abstract scene using particles and noise** - (45 pts for completion and 5 pts for creativity)

Using Three.js and GLSL shaders, create a scene with at least the following elements:

— A particle system that mimics some natural phenomenon – fire, clouds, smoke, etc – that changes or animates over time. You can utilize the GPUParticleSystem.js class, or create your own.

— A noise function that provides realistic features of natural phenomena. You can use the library at [https://github.com/stegu/webgl-noise/](https://github.com/stegu/webgl-noise/), or you are welcome to find another approach of your own.

— Use dat.gui to control some of the noise or particle system parameters.

Extra credit (5 pts):

— Use textured point sprites in your scene.