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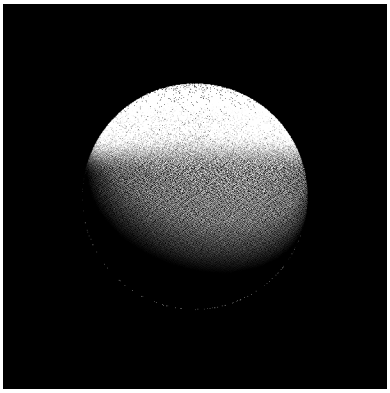
CS 216

24 April 2024

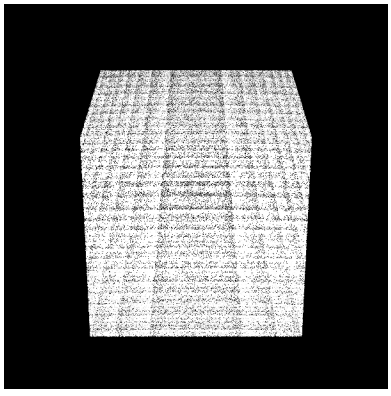
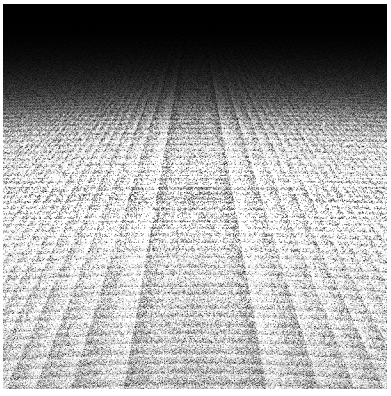
Project 2 - Part 2

Step 1 - Create Height Field

First I started out by copying over my previous RayMarcher files to a new set of RayMarcherHeightField files. I updated the api.cpp file and got the same results as my RayMarcher files.

RayMarcherHeightField Render


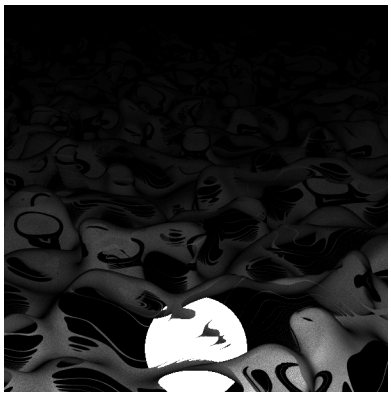
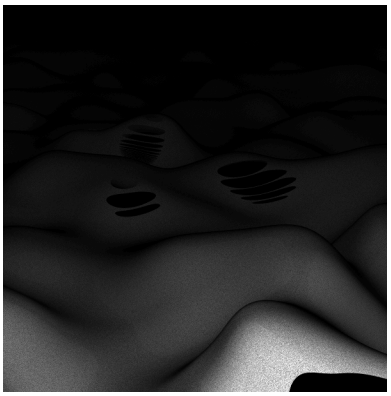
From there I updated the SDF function to create a plane. Notice that the object is initially bound. From there I was able to remove the bounds to get the right image.

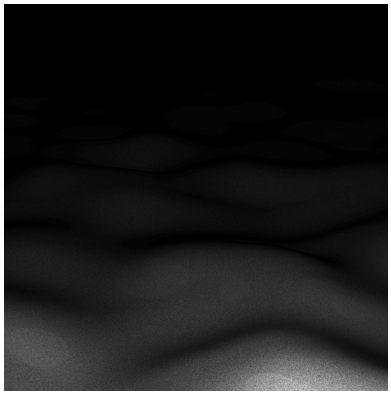
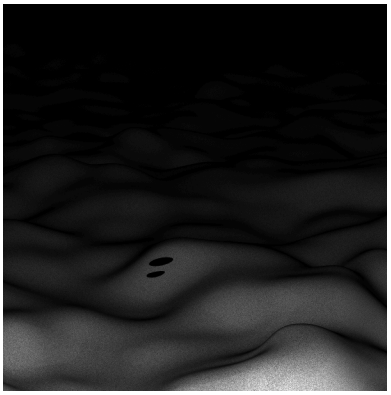
Bound Plane	Unbound Plane
	

From there I implemented noise (without amplitude, octaves, frequency) and got the following results. I had to lower my epsilon to get slightly better normals.

Initial Noise	Lowered Epsilon
	

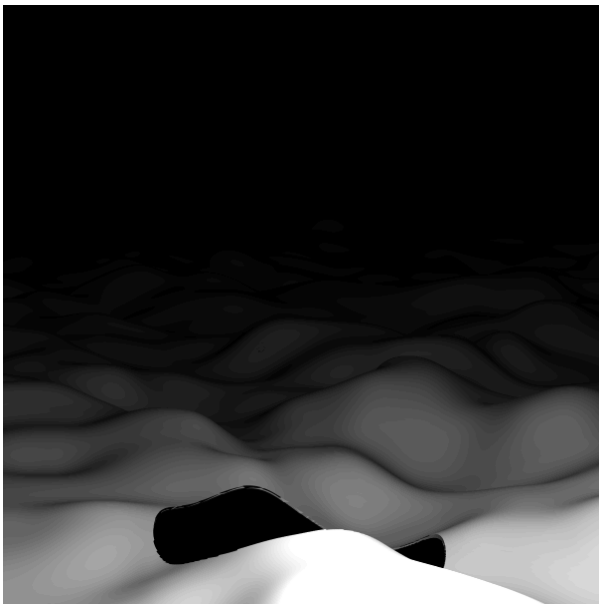
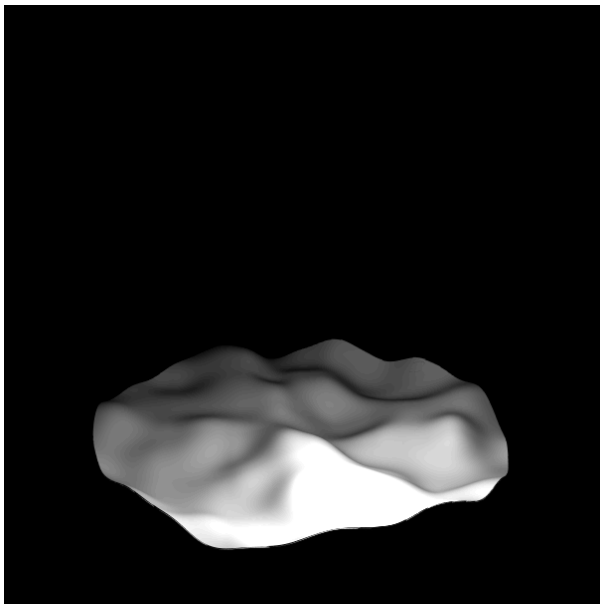
From there I implemented noise with the three parameters. This website was very helpful with pseudo code on how to structure the noise: https://www.arendpeter.com/Perlin_Noise.html. Here are the results.

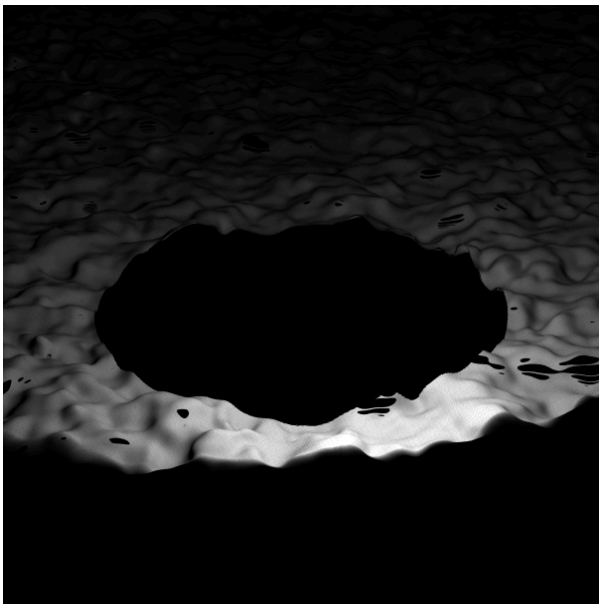
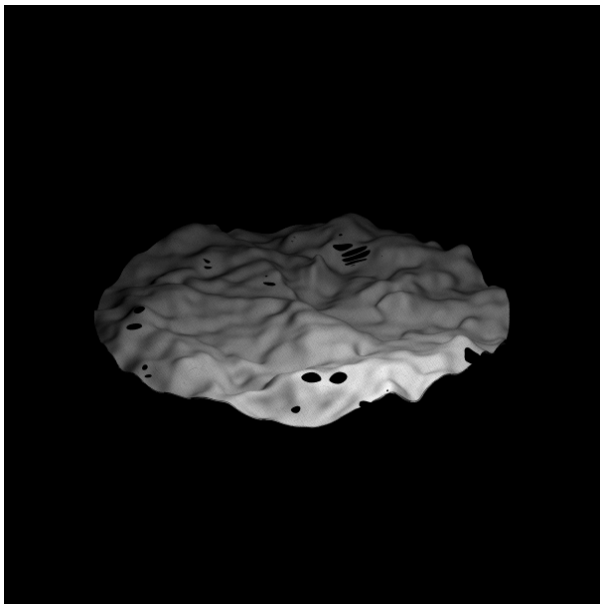
Default (1, 1, 1)	Frequency = (0.5)
	

Amplitude = (0.5)	Octaves = (2)
	

Step 2 - "Primitive Combinations"

For Step 2, I decided to implement multiple of the combinations. The ones that I got the best pictures of were intersection and subtraction.

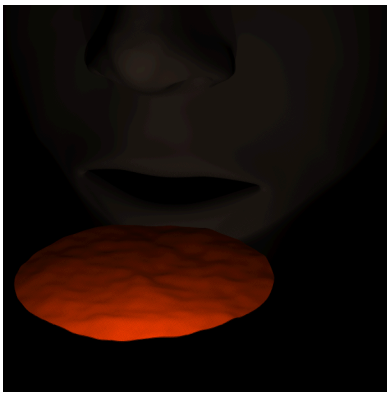
Subtraction	Intersection
	

High Octave Subtraction	High Octave Intersection
	

Step 3 - PBRT Scenes

With how my intersection height field looked, it reminded me of a floating sand dune. This inspired me to try and render a similar scene from the end of Kingdom Hearts (2002). No matter what I tried, I had issues with orienting objects around the height field. There was lots of weird clipping and objects did not want to follow the coordinate system.

In place of the above scene, I took inspiration that the height fields also kind of look like chips. This allowed me to incorporate the head from Lab4 to make it look like it was a chip being eaten.

"Yummy Hot Chip"	"Dorito Chip"
	

For my last image, I was inspired by the subtraction height field to make it look like a mouth lays open under a sinkhole in the desert.

"Desert Sinkhole leads to Unexpected Place"