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2019472

Computer Graphics
Assignment 3

Question 1

(a) Copy the function *createParametricObject* from main.cpp of assignment 1.
Assumption:- The parametric surface implemented is a cylinder with a Radius of 5 units and a Height of 10 units.
Calculate *df/du* and *df/dv* using the parametric equation of the cylinder.
I get

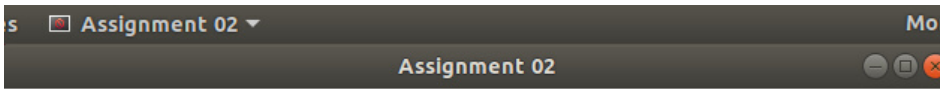
$$\frac{df}{du} = (-Rsin(u),\ Rcos(u),\ 0) \text{ and } \frac{df}{dv} = (0,\ 0,\ 1)$$

Using these equations I calculate the normals at each vertex of the surface. (By normalizing the cross-product of the two.)

(b) I create a struct Light in both main.cpp and vshader_g.vs containing light position (3x1) and light color (3x1). I pass the values for both in the main function.

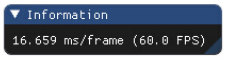
(c) Gouraud Shading.
Assumption:- Shader files for Gouraud shading are vshader_g.vs and fshader_g.fs. The path needs to be changed in the main.cpp file according to the shader intended.
Diffuse light is calculated using the formula from lecture slides.

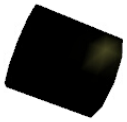
Output



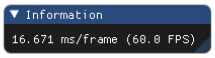
Question 2
I calculated the ambient and specular components in the vertex shader using equations from class slides.

Output
Only Specular Light

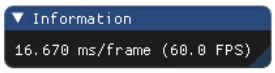




Only Ambient Light



Diffuse + Ambient + Specular Lights



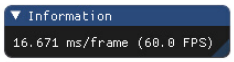
Question 3

I moved the code from vshader_g.vs to fshader_p.fs and made appropriate changes.

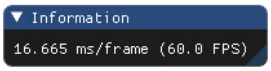
Assumption:- Shader files for Phong shading are vshader_p.vs and fshader_p.fs. The path needs to be changed in the main.cpp file according to the shader intended.

Output

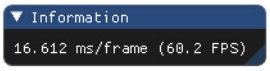
Ambient Light

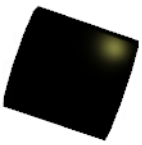


Diffuse Light

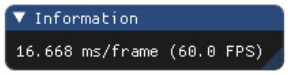


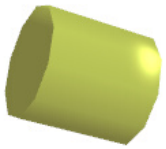
Specular Light





Ambient + Diffuse + Specular Light





Bonus

The normalized colors were added in the fshader_b.fs file.

Assumption:- Shader files for Bonus are vshader_b.vs and fshader_b.fs. The path needs to be changed in the main.cpp file according to the shader intended.

Output