

PHONG LIGHTING

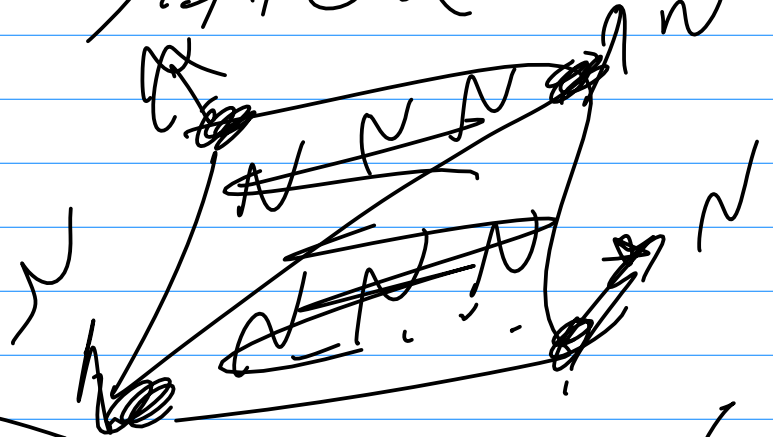
11/7/11



(R, G, B)

MATERIAL

8



COVR AND

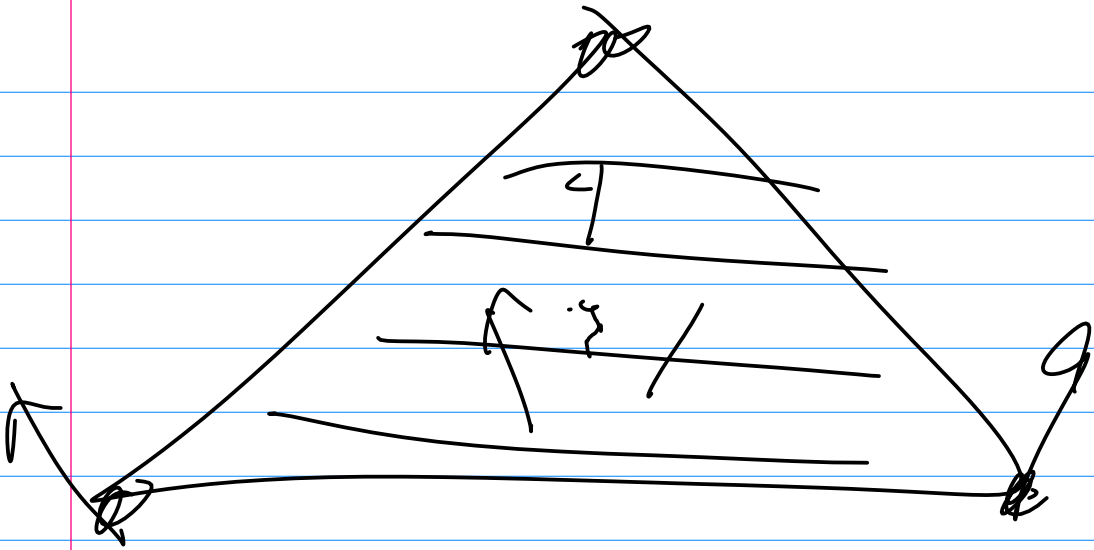
SHADING

PHONG

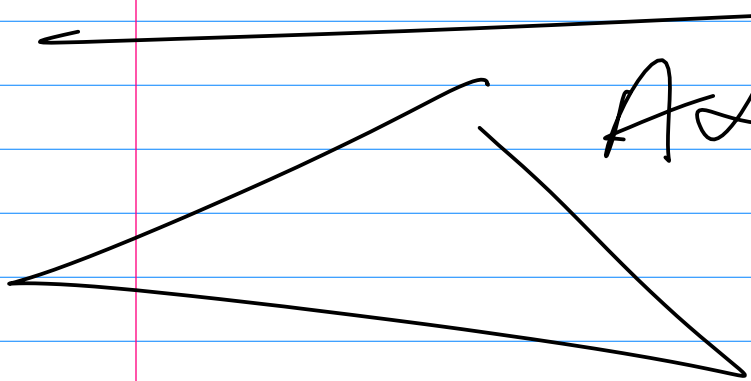
SHADING

NO HIGHLIGHTS (INSIDE FACET)

2



NORMALS



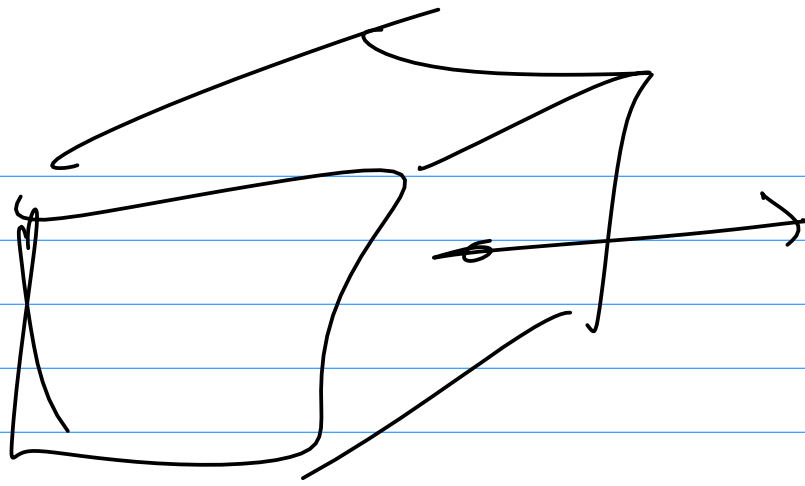
$$Ax + By + Cz + D = 0$$

$$N = \frac{(A, B, C)}{\sqrt{A^2 + B^2 + C^2}}$$

$$x + 2y + 3z + 4 = 0$$

$$N = \left(\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}} \right)$$

Q: DIRECTION OF NORMAL?

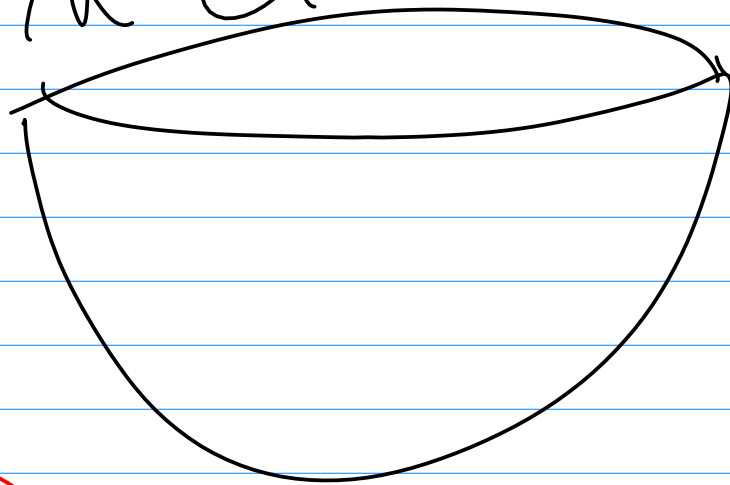


3

FOR CLOSED OBJECT, MAYBE
WANT NORMAL TO POINT
OUT.

HOW TO MAKE THAT HAPPEN?

COMMON EQUATION TYPE IS
PARAMETRIC.



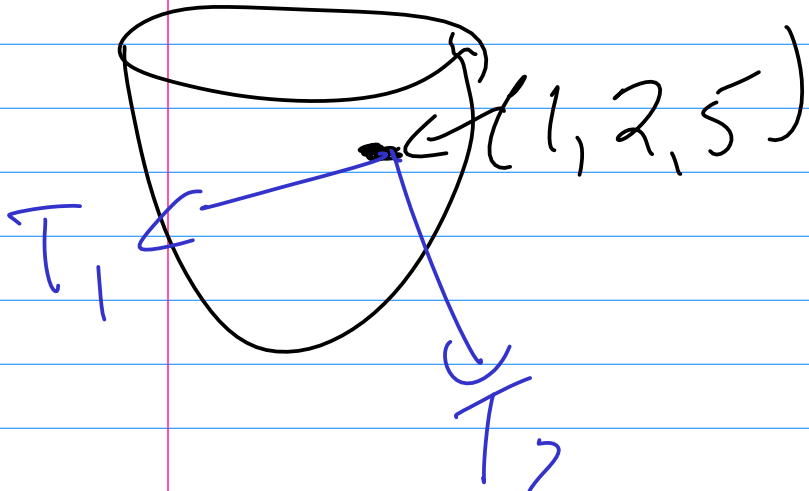
PARABOLA

$$x = u, \quad y = v, \quad z = u^2 + v^2$$

2 PARAMETERS

(N: (u, v)
OUT: (x, y, z)

(1, 2) → (1, 2, 5)



WHAT'S THE
NORMAL THERE?

$$N = T_1 \times T_2$$

2 TANGENT
VECTORS

USE PARTIAL DERIVATIVES

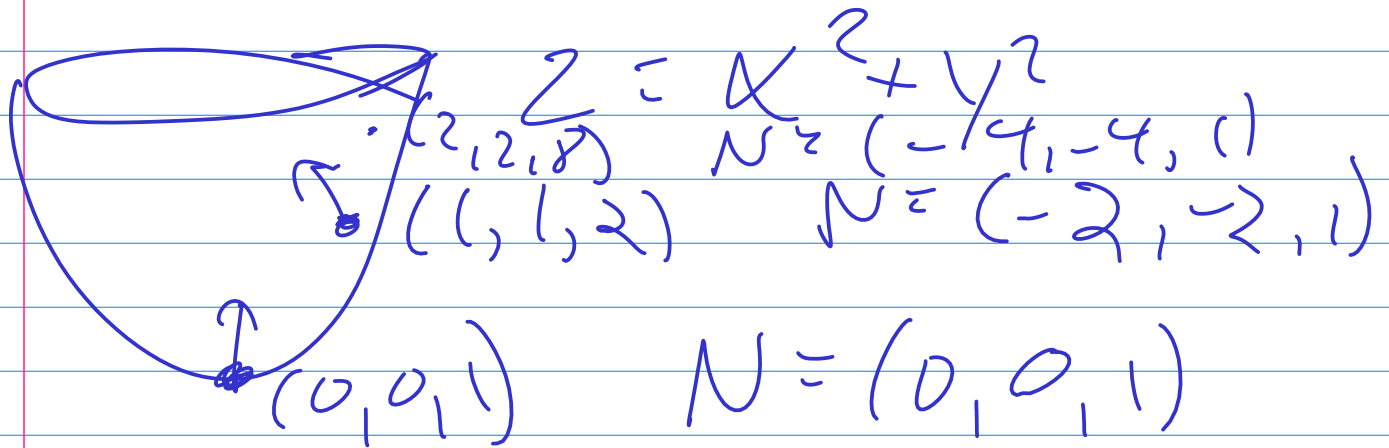
$$P(x, y, z) = P(u, v, u^2 + v^2)$$

$$\frac{\partial P}{\partial u} = (1, 0, 2u)$$

$$\frac{\partial P}{\partial v} = (0, 1, 2v)$$

$$\frac{\partial P}{\partial u} \times \frac{\partial P}{\partial v} = (-2u, -2v, 1) \quad 5$$

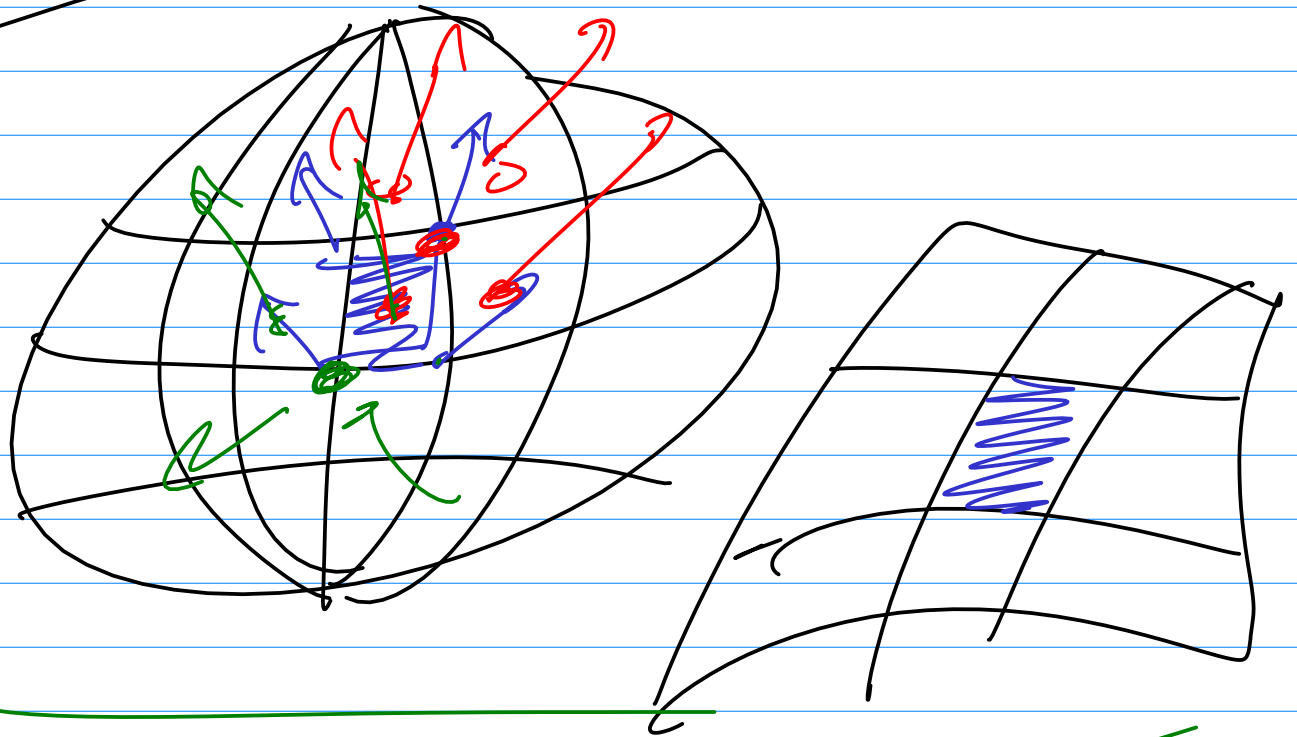
$$N = (-2x, -2y, 1)$$



HAVE TO REDUCE N TO BE
LENGTH 1

MESH

6



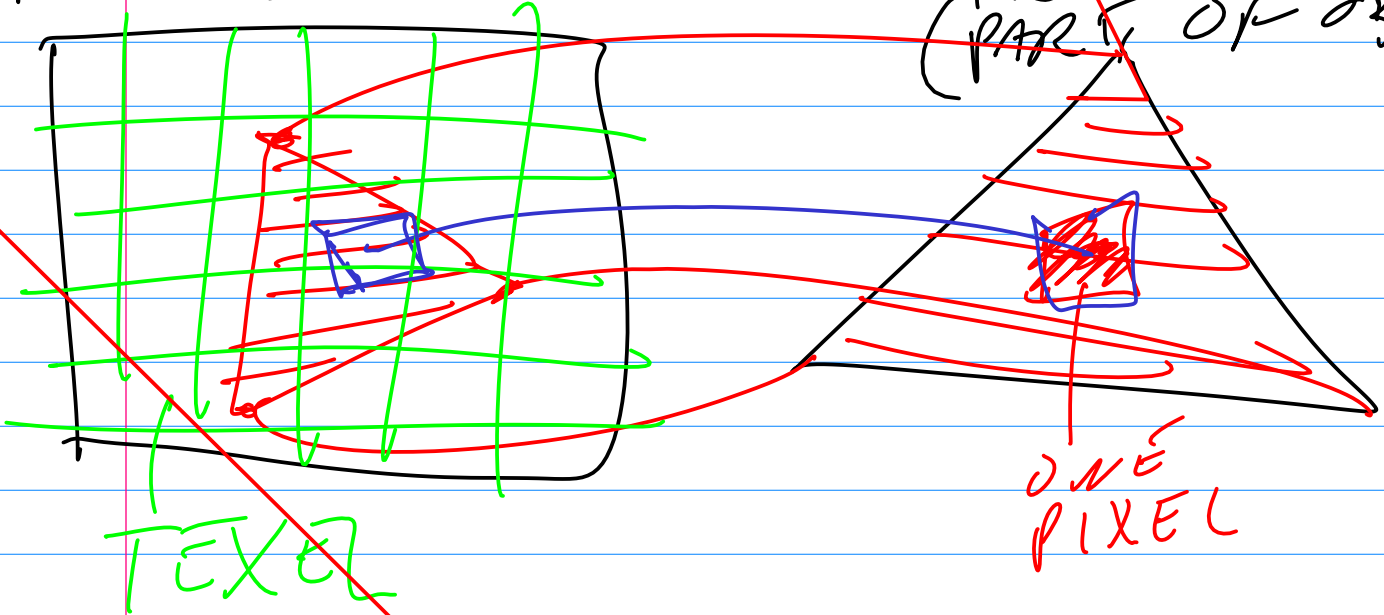
YOUR NORMALS MUST BE
NORMALIZED OPENGL HAS
A SETTING

CH 12 TEXTURES

LOAD TEXTURES . CPP

TEXTURE IMAGE

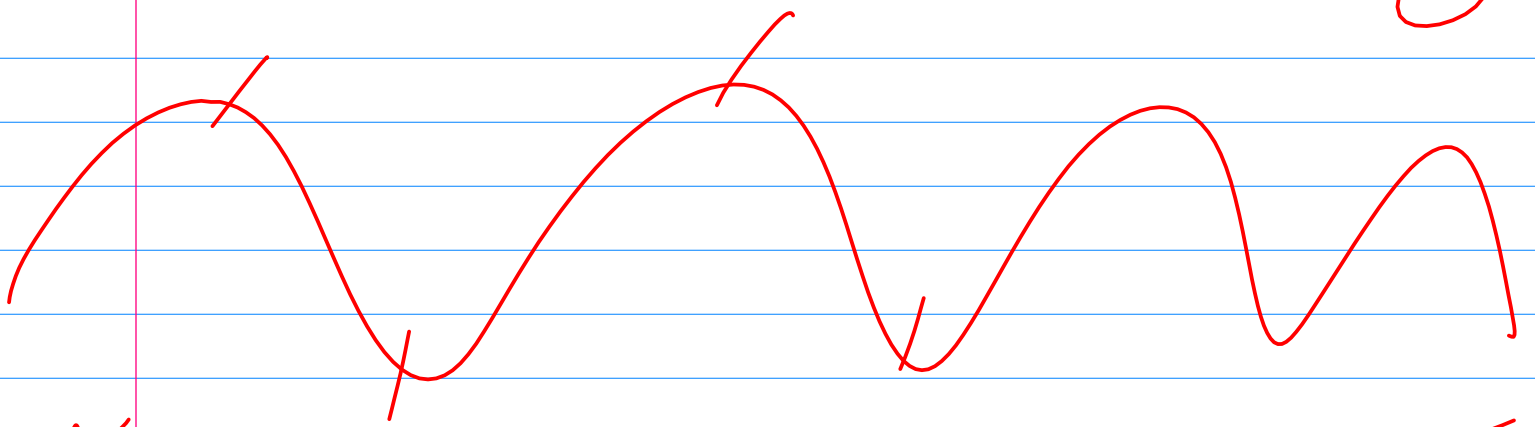
TRIANGLE
(PART OF OBJECT)



FILD ANDSKI . CPP 8476

- SHOWS ALIASING JUST
BELOW HORIZON.

FROM COMMUNICATIONS
ENGINEERING



YOU MUST SAMPLE A WAVE
AT LEAST TWICE PER CYCLE
IN ORDER TO UNDERSTAND IT
& TO RECREATE IT.

OTHERWISE, THE WAVE YOU
RECREATE FROM SAMPLES IS
WRONG.