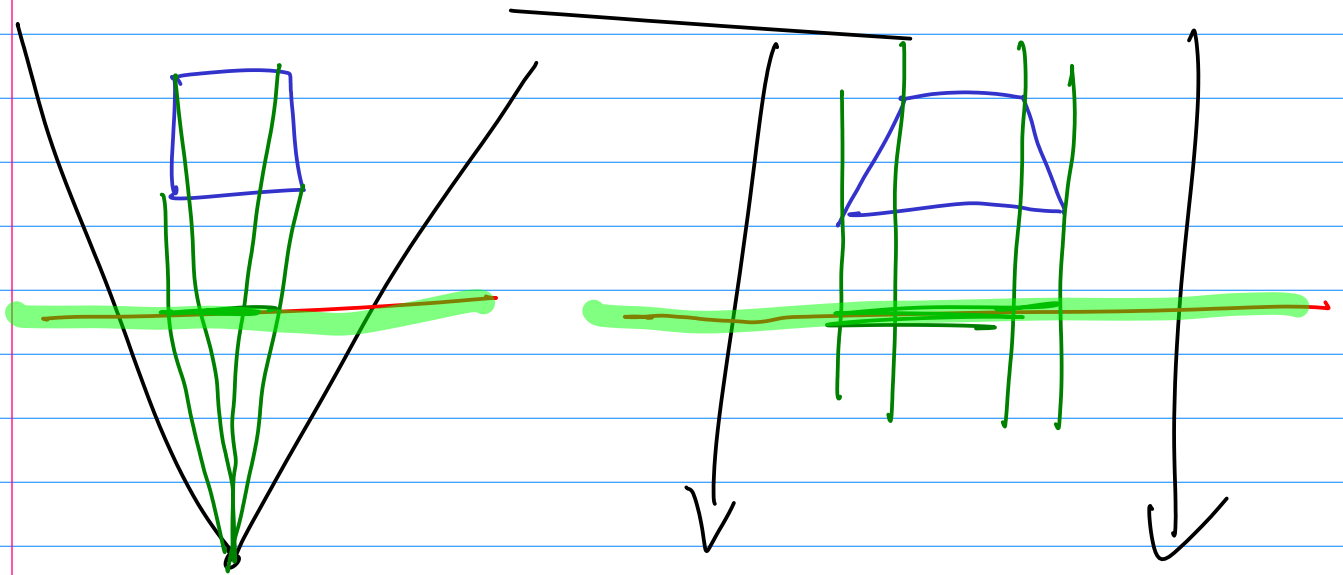


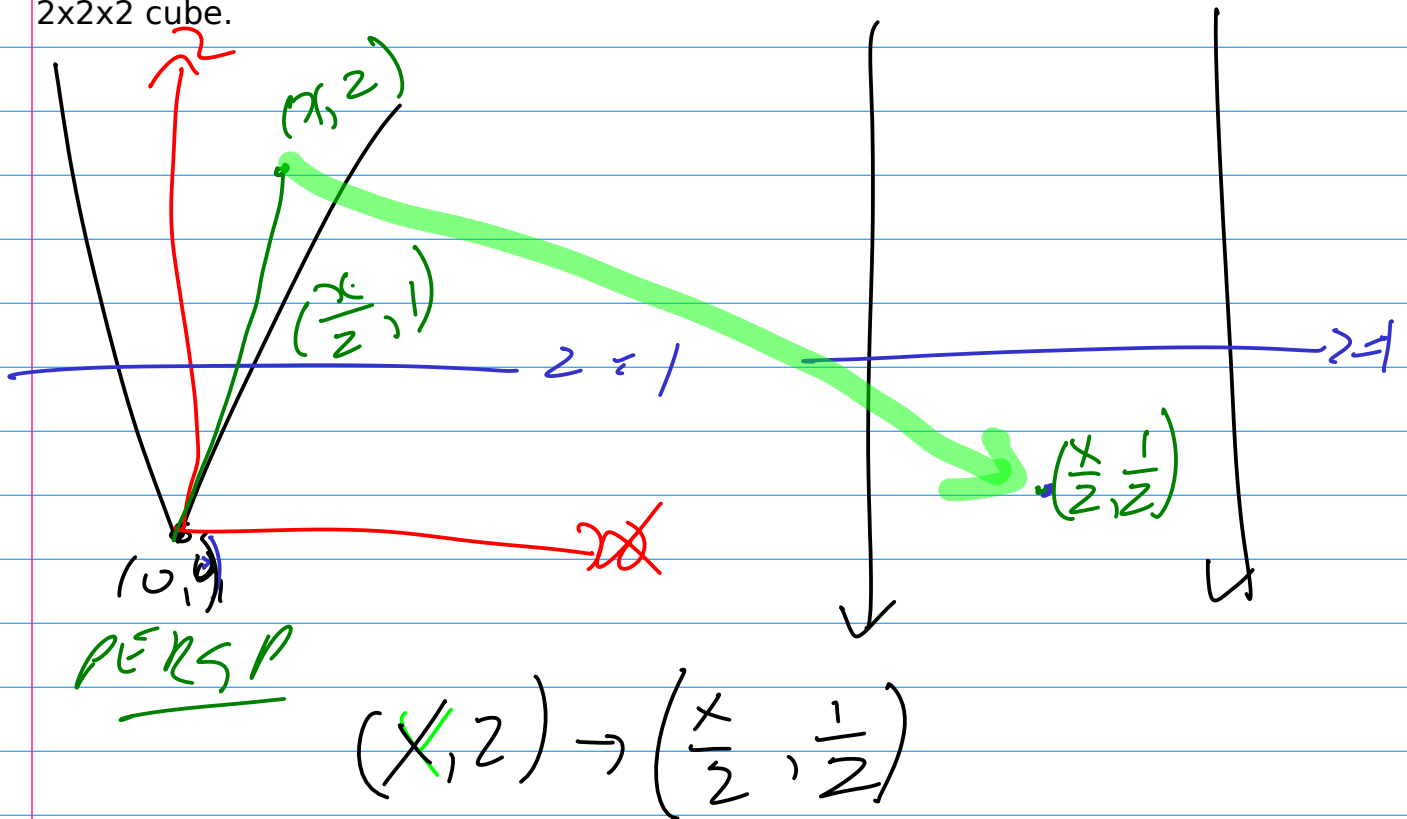
ECSE-4750 10/25/12 p1



Both images are the same: the square viewed with the perspective projection and the trapezoid viewed with the parallel projection.

The view normalization idea is to distort the scene so that we can parallel project it.

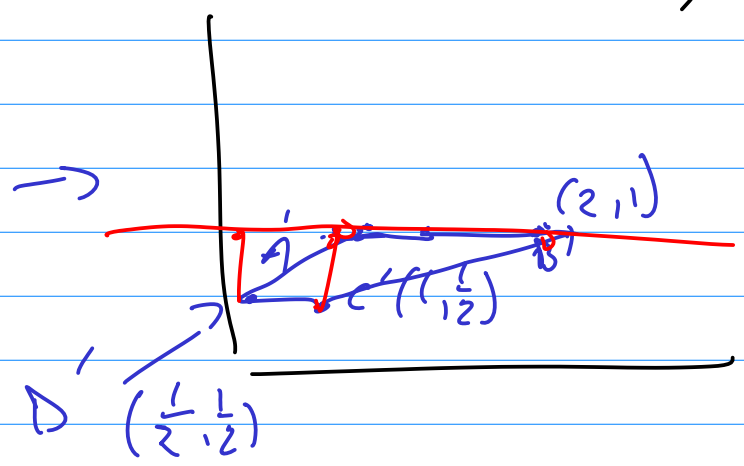
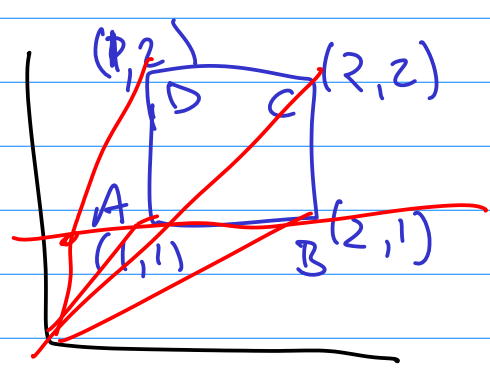
The clip region is transformed from a truncated square pyramid to a $2 \times 2 \times 2$ cube.



IT'S LIKE A PROJECTION, BUT WE'RE PRESERVING DEPTH INFO.

PROJ $(x, z) \rightarrow (\frac{x}{z}, 1)$

NORMIN $(x, z) \rightarrow (\frac{x}{z}, \frac{1}{z})$



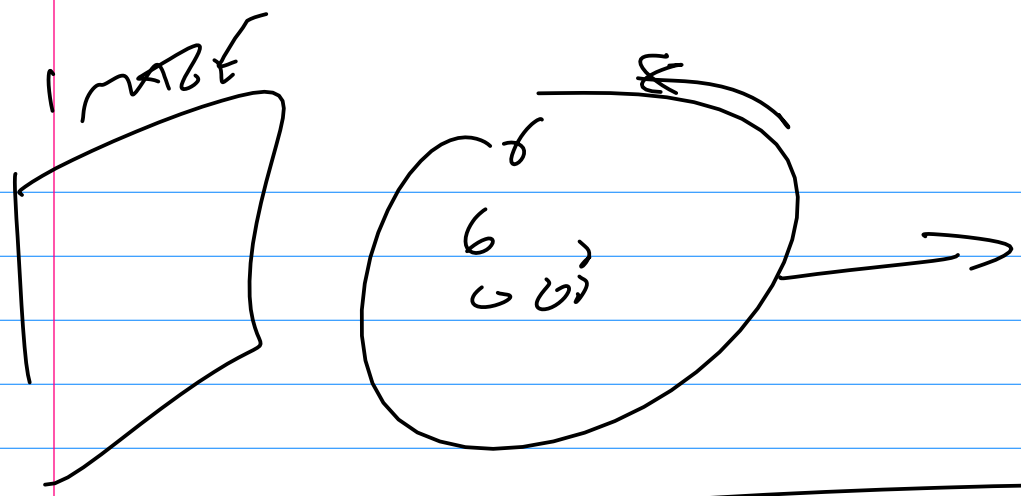
MATRIX

$$(x, y, z) \rightarrow (\frac{x}{z}, \frac{y}{z}, \frac{1}{z})$$

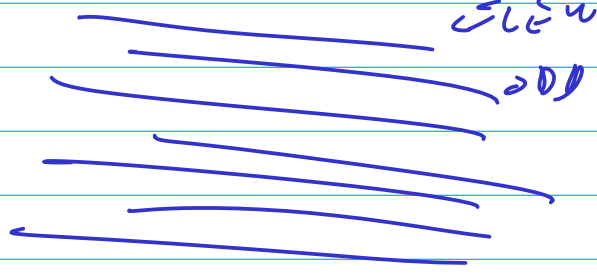
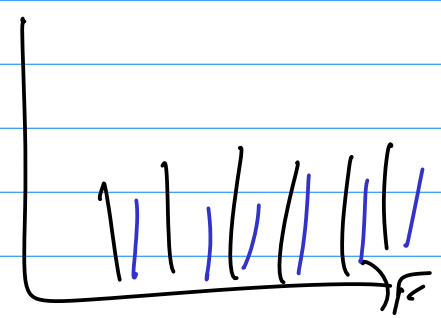
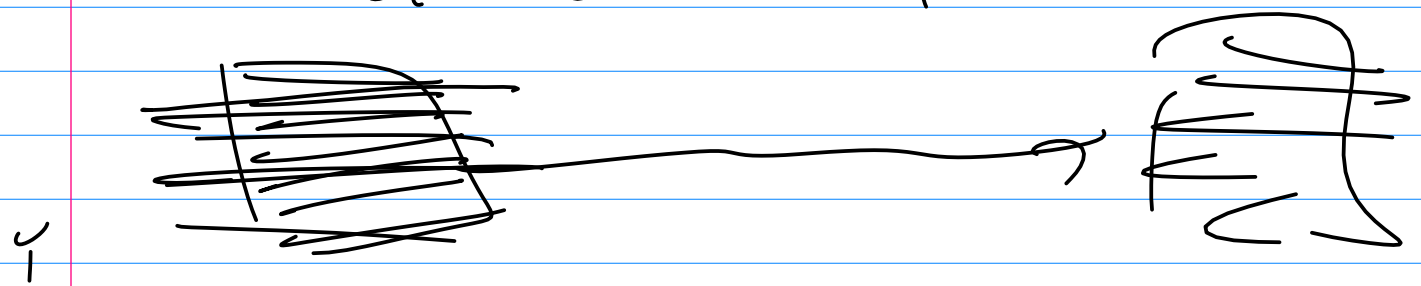
$$(x, y, z, w) \rightarrow (x, y, z, z)$$

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$

Put yourself in the 1920s. You want to xmit video over a wire. How?



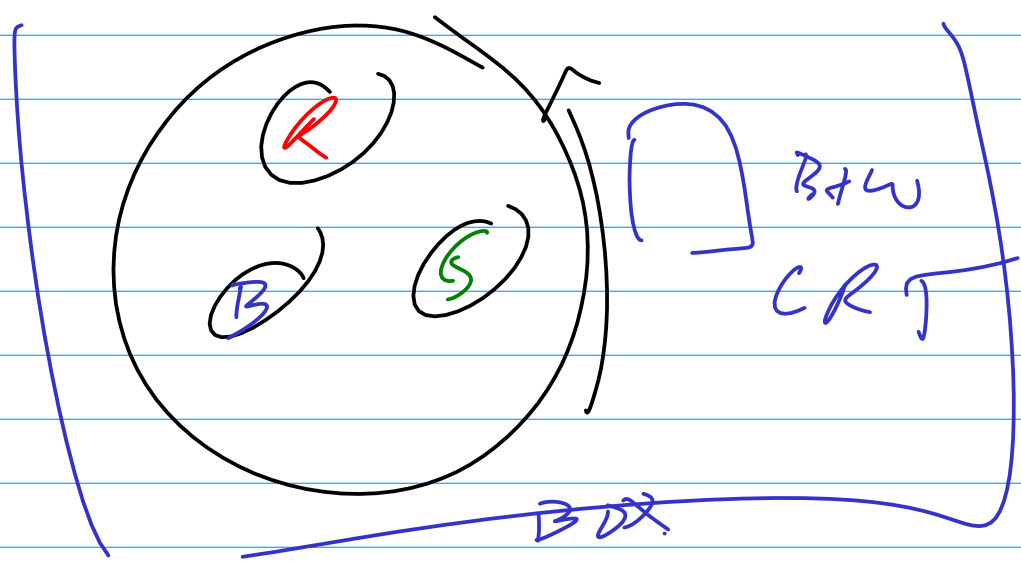
ELECTRONIC TV



525 LINES
 x 20 FRAME
 x 2 FIELDS

FAILED COLOR TV IDEA

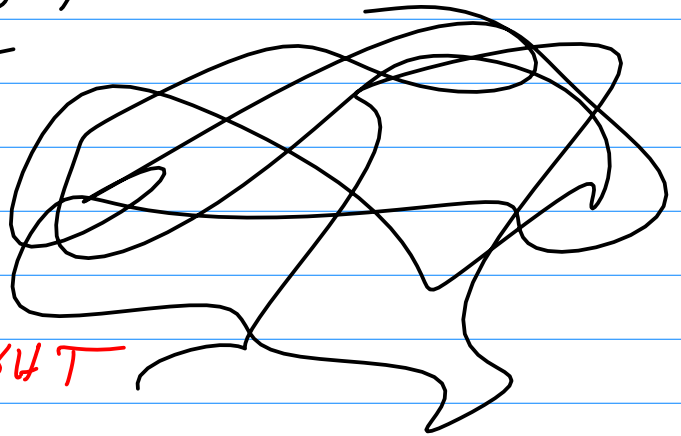
4
VIEWER



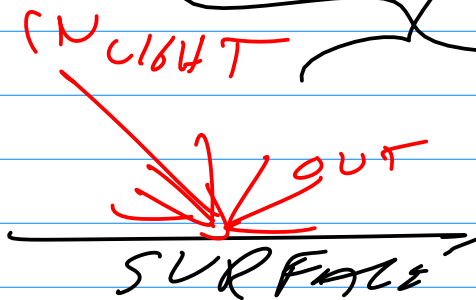
LIGHTING CHAP 11

3 CLASSES OF LIGHT

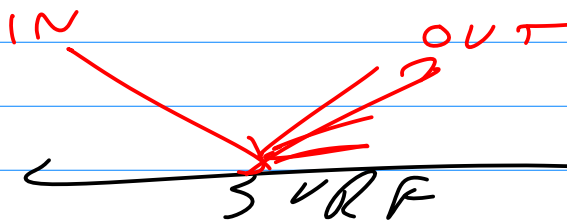
1. AMBIENT



2. DIFFUSE



3. SPECULAR

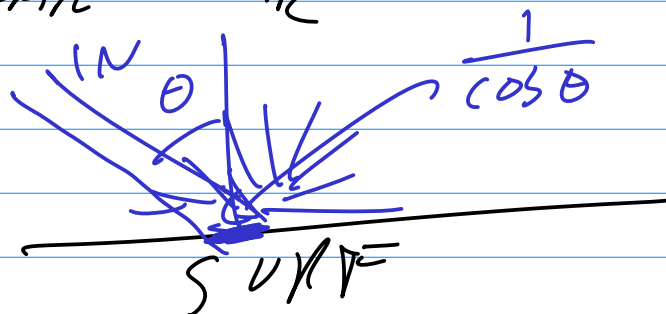


4. EMITTED

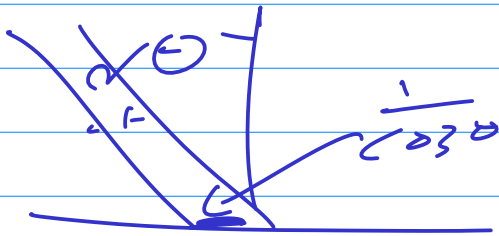
I_{AR} - RED COMPONENT OF AMBIENT LT
 M_{AR} - " " " " MATERIAL

$I_{AR} * M_{AR}$

DIFFUSE



If incoming light is a beam 1 unit wide, it covers an area $1/(\cos t)$ wide on the surface. t = angle from normal of the incoming light.

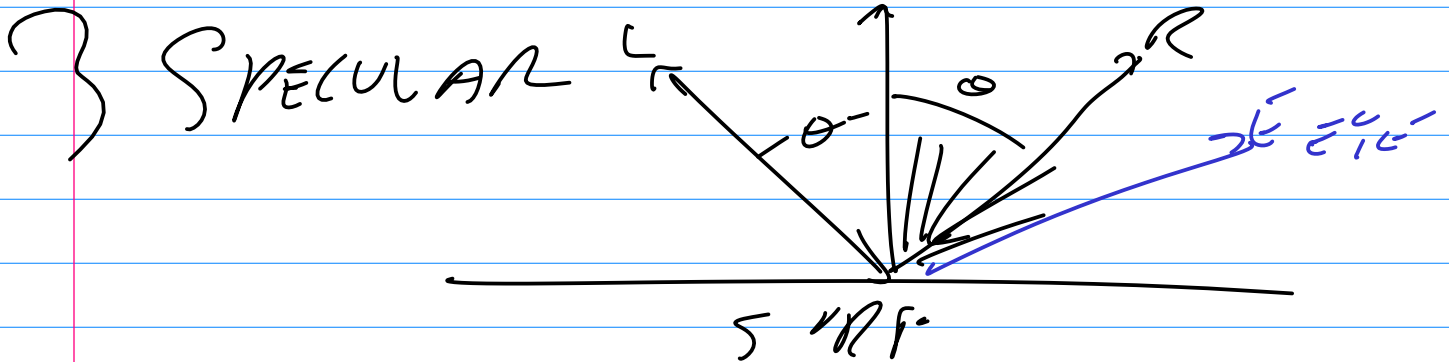


BRIGHTNESS PER UNIT AREA $\propto \cos \theta$

$\theta = 0$	$\cos \theta = 1$
$= 45^\circ$.7
60°	.5



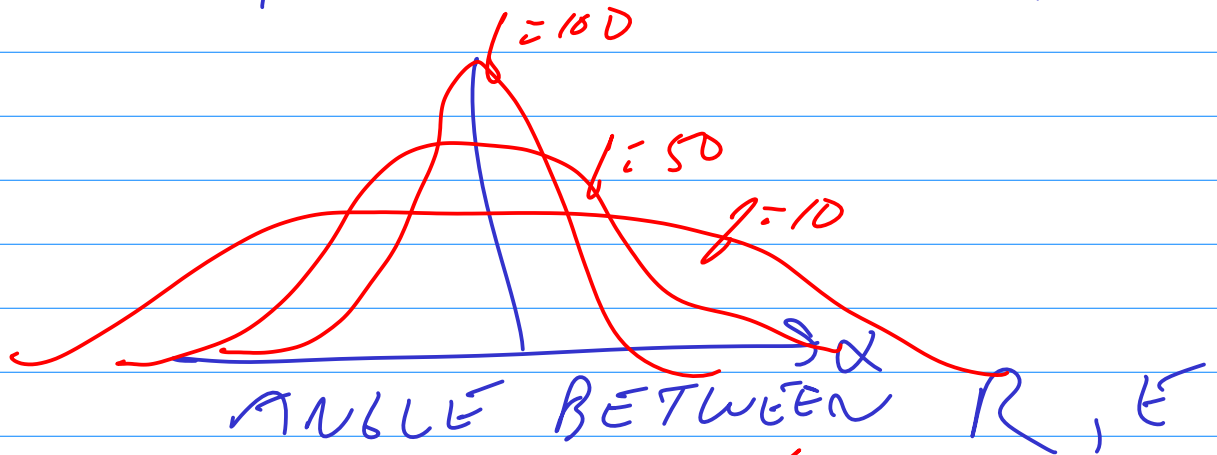
$$I_{dr} M_{dr} \cos \theta$$



AMOUNT OF LIGHT GOING OUT TO \vec{E}
 DEPENDS ON CLOSURENESS OF E TO R
 $(\vec{E} \cdot \vec{R})^2$

ρ IS A SHININESS FACTOR
 $\rho = 100$ VERY
 $\rho = 0$ NOT

SPECULAR, CONTROLLING SHININESS?



RED
BRIGHTNESS

$$L_{SR} M_{SR} (R \cdot E)^6$$

$$L_{AR} M_{AR} + L_{DR} M_{DR} \cos \theta +$$

$$L_{SR} M_{SR} (R \cdot E)^6 + M_{ER}$$

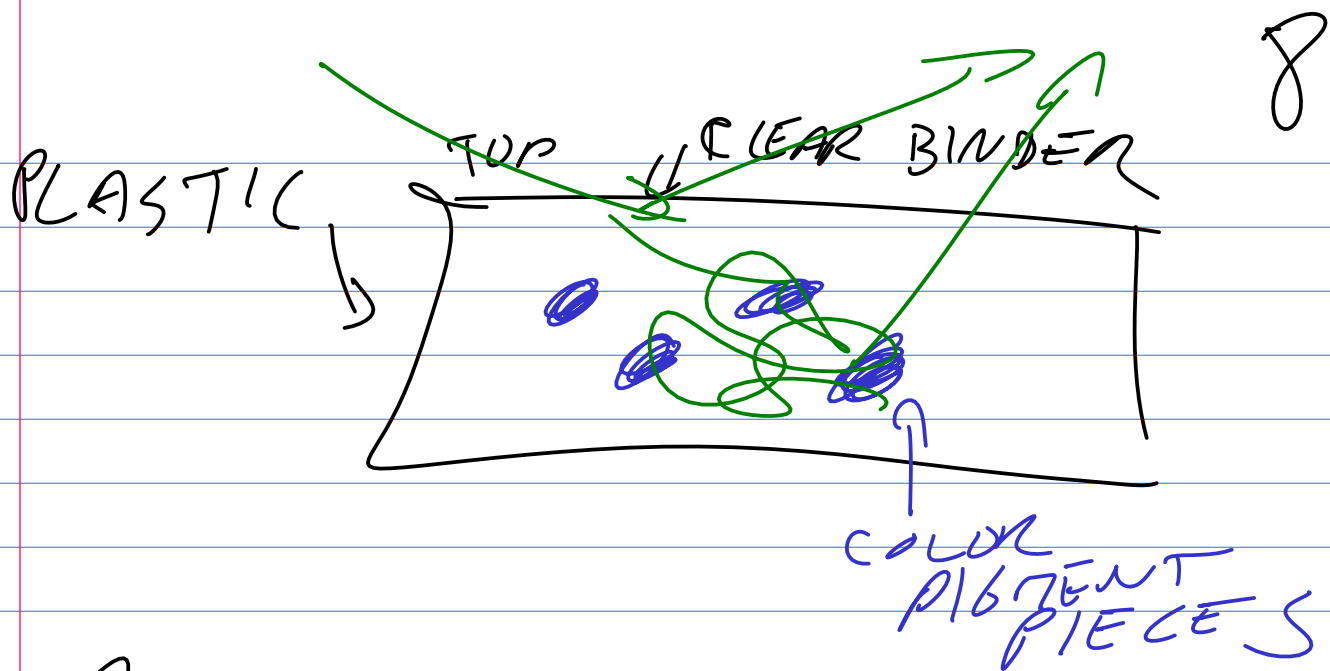
EMITTED
RED

IGNORING α (OPACITY)

LIGHT HAS 9 COMPONENTS
MATERIAL (3)

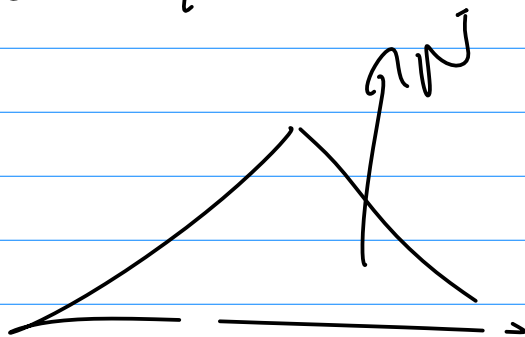
OPENGL CAN HAVE 8 LIGHTS
EACH MATERIAL IS DIFFERENT.

ALL IS USER-SETTABLE,



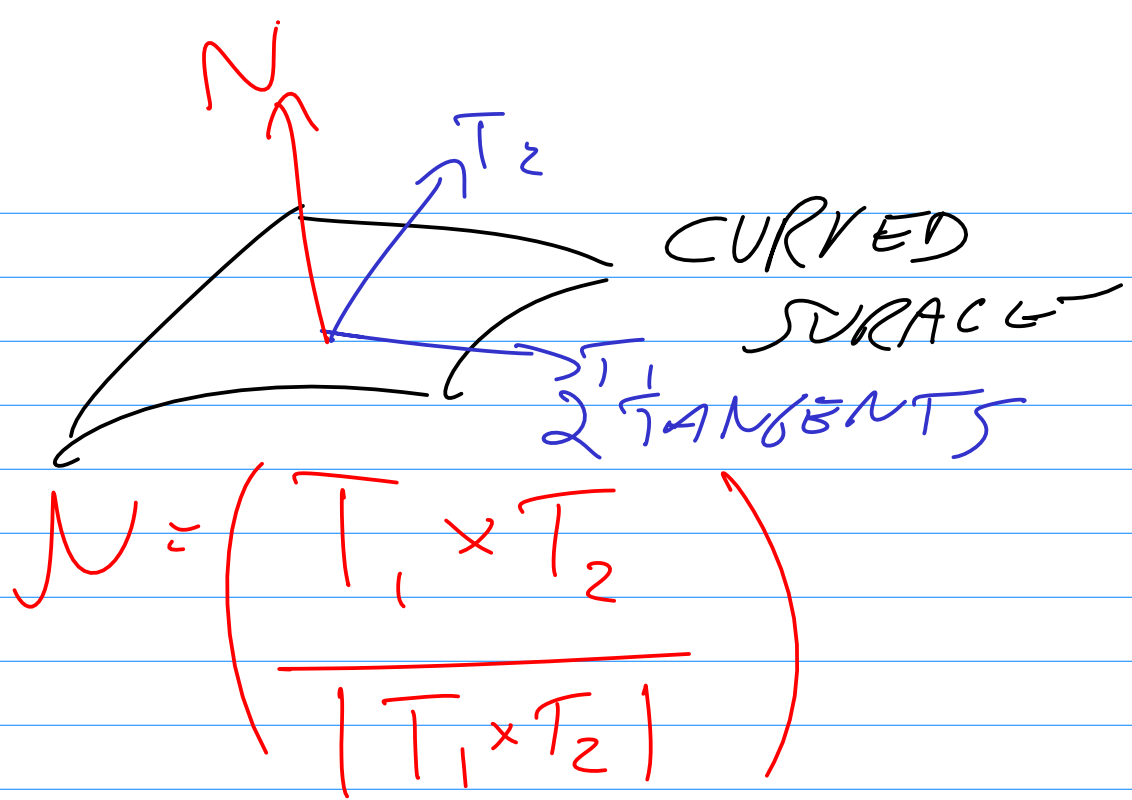
ALL IS USER-SETTABLE IN OPENGL.

DIFFUSE + SPECULAR REQUIRE SURFACE NORMALS

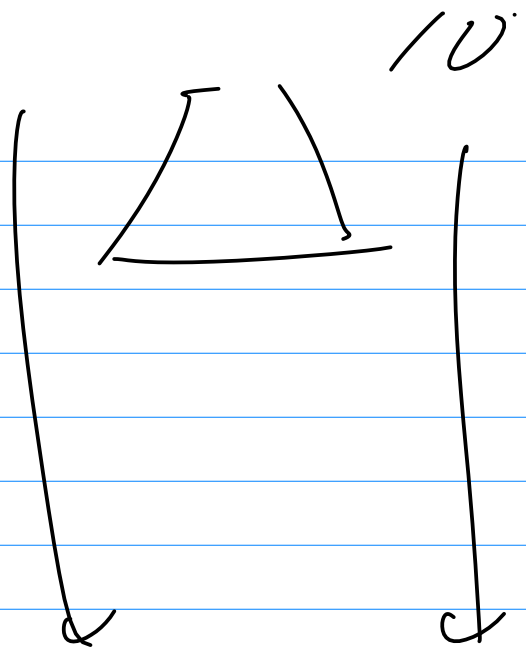
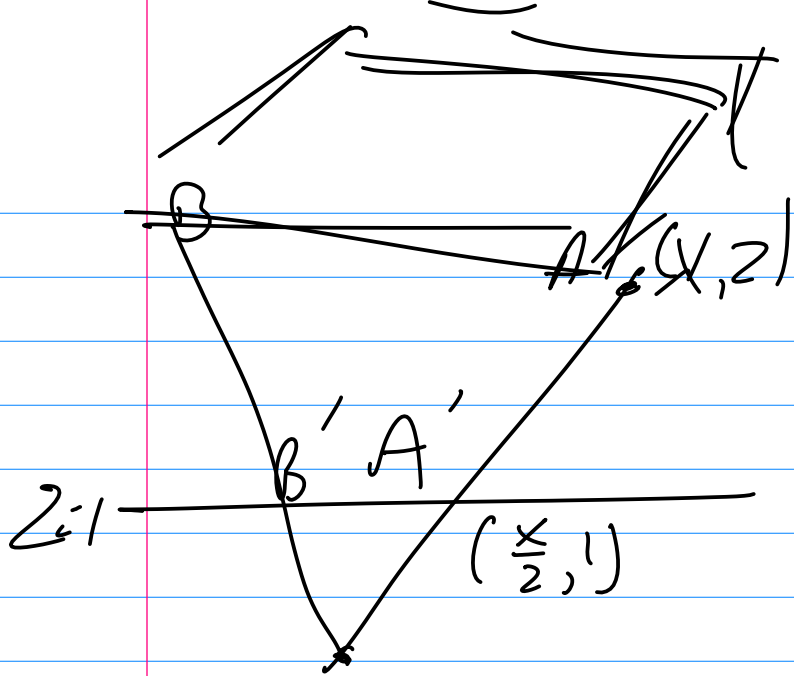


YOU CAN COMPUTE IT YOURSELF + TELL OPENGL

of $\{ \text{NORMAL} \}$ ()
 FOR EACH VERTEX (INSTEAD OF COLOR)



Mon - OPENGL CLIPPING.



IF NEW OBJECT WITH \parallel PROJ
LOOKS SAME AS OLD OBJECT
WITH PERSPECT. PROJ.

$$x' = \frac{x}{2}$$

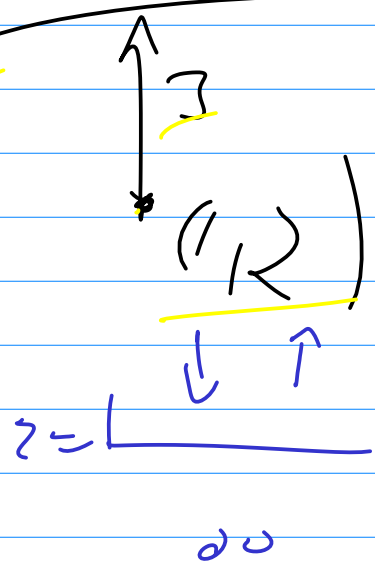
WHY? PERSP $x \rightarrow \frac{x}{2}$

\parallel PROJ $x \rightarrow x$

ALSO WANT STRAIGHT LINES TO
STAY STRAIGHT

$$\therefore z' = \frac{1}{2}$$

2-5



1. TR $(-1, -2)$
2. SC $\frac{1}{3}$
3. VIEW NORM
4. | POINT ? , 1
- 5

ex. ROT ABOUT $(1, 1)$ BY 90°

