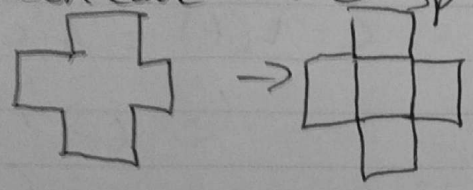
CS 488 Clipping Pg 1

Viewports are usually convex, if they are concave we split it up to make it convex.

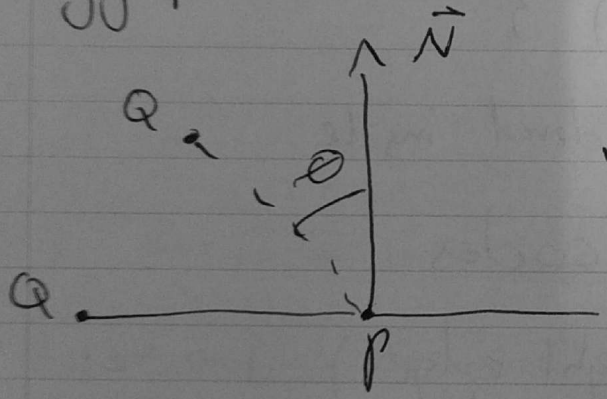


Implicit representation of a line:

$\ell(Q) = (Q-P) \cdot \vec{n}$

be careful when $(Q-P) \cdot \vec{n} = 0$ → sometimes 0 is not given because floats are not exact. use an epsilon as zero.

ggEpsilon = 0.00000000001

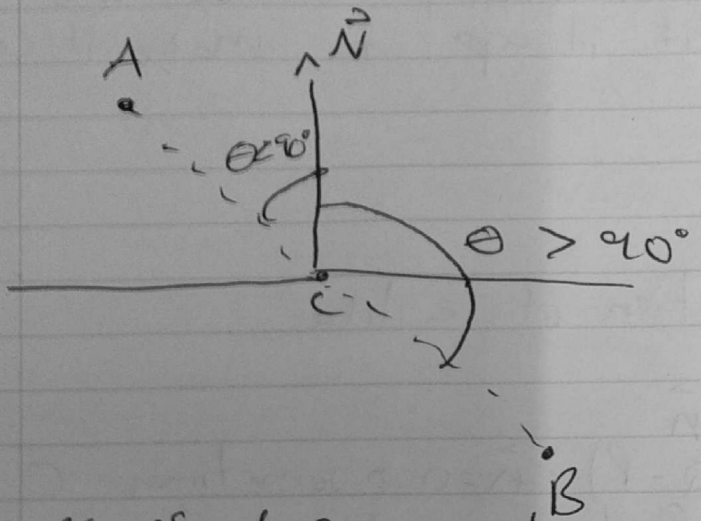


$P(Q) = (Q-P)\vec{n} > 0 \rightarrow \theta < 90°$

• Q is outside

$< 0 \rightarrow \theta > 90°$

$P(A) = (A-P)\cdot\vec{n} > 0$



$C \cdot l(C) = (C-P)\cdot\vec{n} = 0$

$C = L(t) = A + t(B-A)$

↳ $t = ?$

$= \frac{(A-P)\cdot\vec{n}}{(A-B)\cdot\vec{n}}$

$P(B) = (B-P)\cdot\vec{n} > 0$

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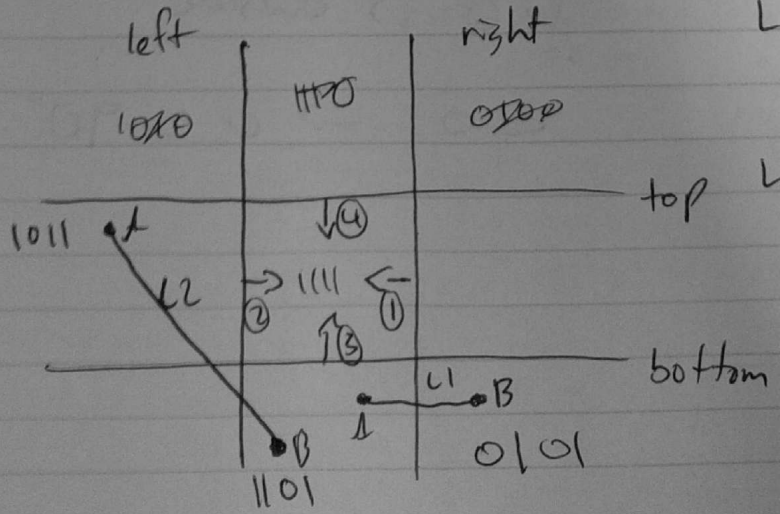
$(A-P)\cdot\vec{n} \rightarrow wec(A)$
$(B-P)\cdot\vec{n} \rightarrow wec(B)$
} window edge coordinates.

points on edge considered inside.

Liang & Barsky Outcodes

1st bit: right of the right edge
2nd bit: left of the left edge
3rd bit: below the bottom edge
4th bit: above the top edge
} 1 → yes, 0 → no



L1 ⇒ OA | OB = 1101 ≠ 1111

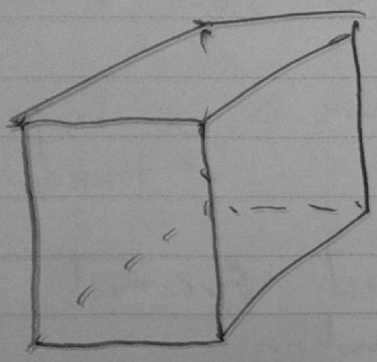
trivially reject

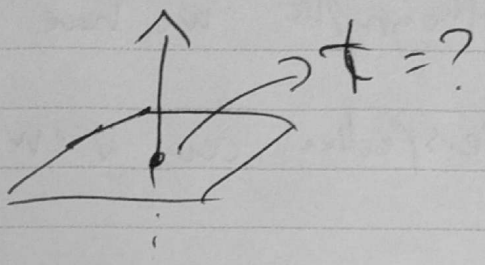
L2 ⇒ OA | OB = 1111 = 1111

OA & OB = 1001 ≠ 1111

Cannot trivially accept.

3D clipping



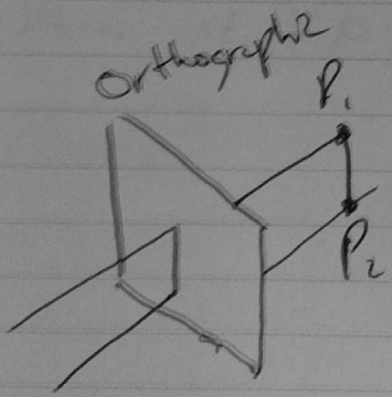


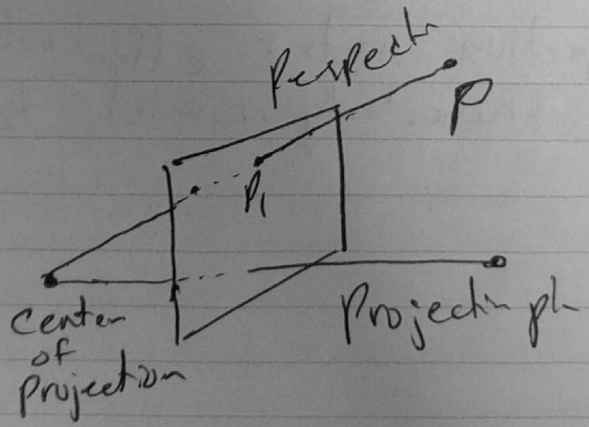
- need 6 bits for 6 sides

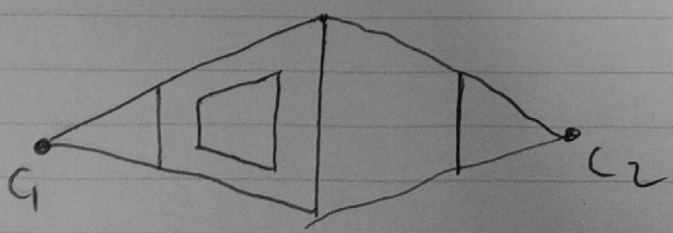
many types of projection

- Parallel
  - Orthographic: direction of projection is normal to the projection plane
  - oblique: not necessarily
- Projection
- Perspective

look at
look from
field of view
near (n) & far (f) planes





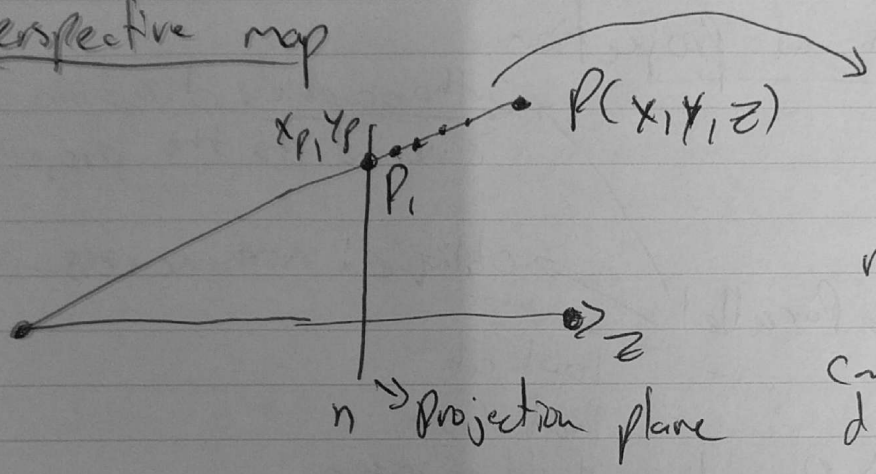


For orthographic we have a cube as our viewing vdune

For perspective our viewing vdune is a trapazoidal prism?
- truncated ~~prism~~ pyramid.

we will convert the truncated pyramid to the cube & keep depth information

Perspective map



we lose info for all points along line ~~of this~~ must keep depth

calc z' to store depth info.

$$x_p = \frac{x \cdot n}{z} \qquad y_p = \frac{y \cdot n}{z}$$

A projection matrix effectively represents transforming the truncated pyramid to a cube with depth info.