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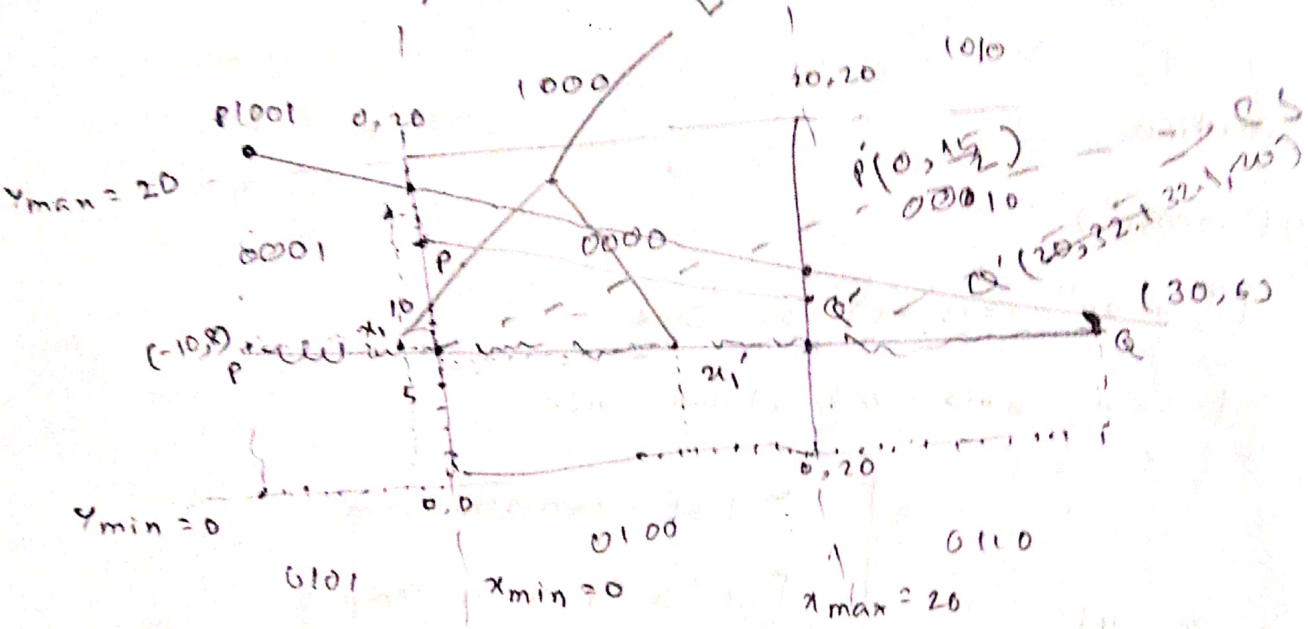
(-10, 8) and (30, 6)

- Liang Barsky
- Cohen - Sutherland

| find clipped section

Clip boundary = 20



Using Liang Barsky we get

$$u_{left} = \frac{q_1}{p_1} = \frac{-10-0}{-(30-(-10))} = \frac{-10}{-40} = \frac{1}{4} = u_{min}$$ Entering

$$u_{right} = \frac{q_2}{p_2} = \frac{20-(-10)}{30-(-10)} = \frac{30}{40} = \frac{3}{4} = u_{max}$$ Exiting

$$u_{bottom} = \frac{q_3}{p_3} = \frac{y_0 - yw_{min}}{-\Delta y} = \frac{18-0}{-(6-8)} = \frac{8}{2} = 9 \quad u>0$$

$$u_{top} = \frac{q_4}{p_4} = \frac{yw_{max} - y_0}{\Delta y} = \frac{20-18}{6-8} = \frac{2}{-2} = -1 \quad u<0$$

We have

$u_{min} = \frac{1}{4}$; $u_{max} = \frac{3}{4}$

$P_{end} - P_0 = (30 + 10, 6 - 8) = (40, -2)$

If $u_{min} < u_{max}$, there is a line segment

So we need to draw a line from

$(-10 + 30 \times \frac{1}{4}, 18 + (-2) \times \frac{1}{4}) = (-10 + 7.5, 18 - \frac{1}{2})$

$= (-2.5, 17.5)$

$x_1 \text{———} x_2$

x_1

TO

$(-10 + 30 \times \frac{3}{4}, 18 + (-2) \times \frac{3}{4}) = (-10 + 22.5, 18 - \frac{3}{2})$

$= (12.5, 16.5)$

x_1'

$x = 3/4,\ y = 31/4$ - CS
LB $(0, 10)\ A'$ $(10, 5)\ B'$

Liang- Barsky algo

A line segment has with end points

(x_0, y_0) and (x_{end}, y_{end})

we can describe in parametric form

$x = x_0 + u\Delta x$

$y = y_0 + u\Delta y$

where

$\Delta x = x_{end} - x_0$

$\Delta y = y_{end} - y_0$

It is more efficient than cohen sutherland

A line is inside the clipping region for values of u such that

$x w_{min} \leq x_0 + u\Delta x \leq x w_{max}$

$y w_{min} \leq y_0 + \Delta y \leq y w_{max}$

$\Delta x = x_{end} - \cancel{x_0}\ x_0$

$\Delta y = y_{end} - y_0$

$u_k = \frac{q_k}{p_k}$

$p_1 = -\Delta x \quad q_1 = x_0 - x w_{min}$ (Left Boundary)

$p_2 = \Delta x \quad q_2 = x w_{max} - x_0$ (Right Boundary)

$p_3 = -\Delta y \quad q_3 = y_0 - y w_{min}$ (Bottom boundary)

$p_4 = \Delta y \quad q_4 = y w_{max}$ (Top boundary)

$p_k < 0$, as u increases, line goes from outside to inside - entering

$p_k > 0$, line goes from inside to outside - exiting

$p_k = 0$, line is parallel to edge.

By using Cohen Sutherland we get

Given

$P(-10, 18)$

$Q(30, 6)$

The using AND we get

$A = 0001$ | 0 | 0 | 0 | 1 | T B R L

$B = 0110$ | 0 | 1 | 1 | 0 | T B R L

0000 is clipping candidate

$\therefore$ So the line is accepted

for P_p: $x = 0$

$y = y_1 + m(x - x_1)$

$= 18 + \frac{6-18}{30+10} \times (0 - (-10))$

$= 18 + \frac{-21}{40} \times 10 = 18 + -0.3(0+10)$

$= 8 + \left(-\frac{1}{2}\right) = 18 - 3 = 15$

$= \frac{15}{2}$ $\left(0, \frac{15}{2}\right)$

for Q: $y = 20$

$x = x_1 + \frac{y - y_1}{m}$

$y = m(x_{max} - x_1) + y_1$

$= -0.3(20-30) + 6$ $= 30 + \frac{20-6}{0.3}$

$= 3 + 6$ $= 30 + \frac{16 \times 2}{15}$

$= 9$

$Q(20, 9)$ $= \frac{482}{15} = 32.1$

intersecting points $\left(0, \frac{15}{2}\right)$

Scanned with CamScanner