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Section: BSCS-12-A
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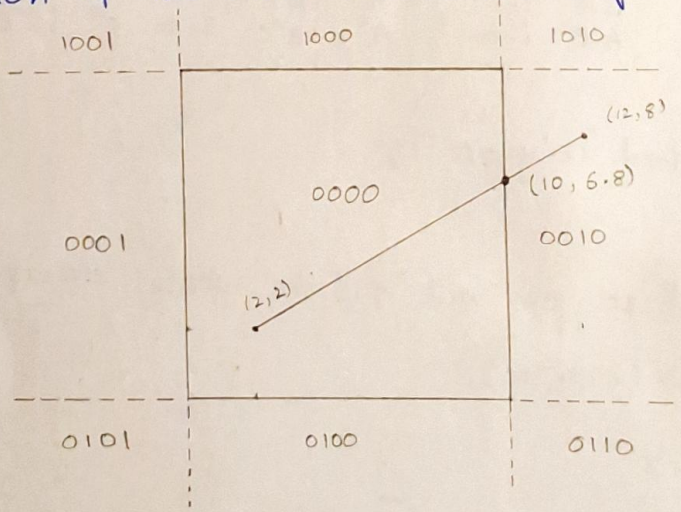
CG Assignment 2

Scenario 1:

Q1.

I will recommend the Liang-Barsky Line Clipping Algorithm as it is more efficient than Cohen Sutherland Algo because it uses parametric equation which reduces the number of calculations needed. This makes Liang-Barsky Algo Simpler to implement and requires fewer intersection calculations. It directy computes the visible portion of the lines without needing to classify regions.

Q2.



Region Assignment
$x > 10 \rightarrow 0010$
$x < 0 \rightarrow 0001$
$y > 10 \rightarrow 1000$
$y < 0 \rightarrow 0100$

Checking Cases:
P1(2,2) → 0000 → keep
P2(12,8) → 0010 → Clip

Clipping the point P2:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-2}{12-2} = \frac{6}{10} = 0.6$$

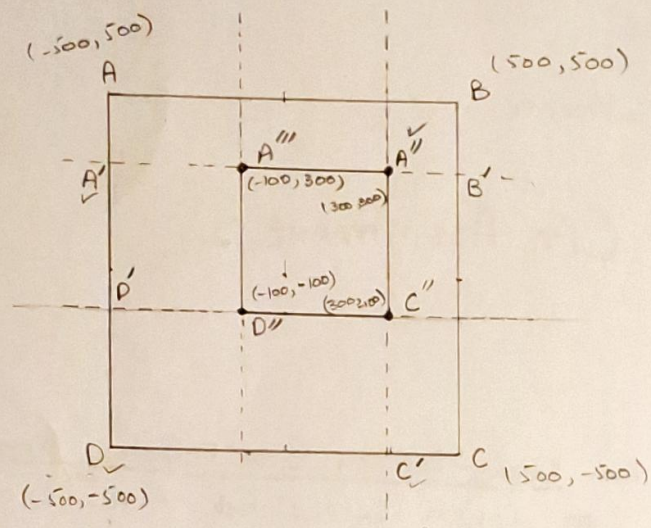
$$y = y_1 + m(x - x_1) = 2 + 0.6(10-2) = 2 + 0.6(8) = 2 + 4.8 = 6.8$$

Result: New Point is (10, 6.8)

So the new line becomes (2,2) → (10, 6.8)

Scenario 2

Q1.



Clipping order

T R B L

we will use sutherland Hodgman Polygon clipping

Top Side	case	result
AB	0-0	discard
BC	0-i	B'C
CD	i-i	D
DA	i-0	A'

Right Side	Case	result
B'C	0-0	discard
CD	0-i	C'D
DA'	i-i	A'
A'B'	i-0	A''

Bottom Side	case	result
C'D	0-0	discard
DA'	0-i	D'A'
A'A''	i-i	A''
A''C'	i-0	C''

Left Side	Case	Result
D'A'	0-0	discard
A'A''	0-i	A'''A''
A''C''	i-i	C''
C''D'	i-0	D''

So the final clipped Polygon is:

A'''A'C''D''

The final clipped polygon will fill the whole viewport of (-100, -100) to (300, 300).

Q2.

If the clipping region is not a perfect rectangle but an irregular shap like a country's border then we should use the weiler-Atherton Polygon Clipping. The weiler-Atherton Algo can handle complex shapes and clips polygons against arbitrary polygons including irregular shapes ~~and cur~~ with curved boundaries. This Algo handles concave and convex clipping regions making it ~~so~~ suitable for real-world geographical boundaries like coastlines. This algorithm is precise and flexible. Weiler-Athertonis used in Geographical Information Systems (GIS).

Scenario 3:

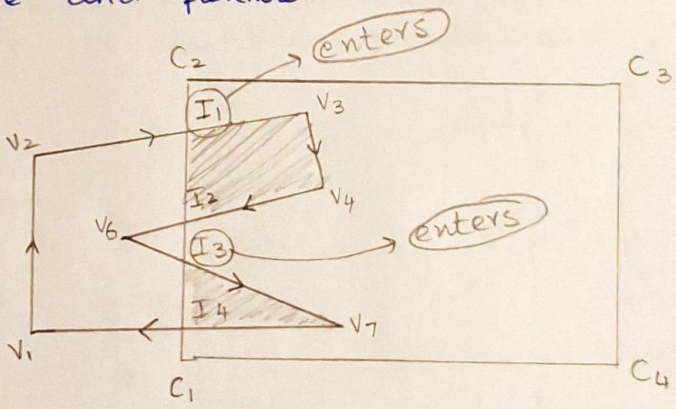
Q1.

Since the window is rectangular we will use Sutherland-Hodgman Polygon Clipping Algo because it is simple to implement which makes it fast to implement and use in real time applications such as video conferencing application with dynamically resizable window. Sutherland Hodgman is also designed for rectangular clipping window the same as a video conference window.

Q2.

We will use the Weiler-Atherton Polygon Clipping Algo to handle an irregularly shaped window as this algo is optimized for irregular shapes and concave and convex polygons and it is precise and flexible.

Example:



Subject		Clip
	V_1	C_1
	V_2	I_4
start	I_1 enter	I_3
	V_3	I_2
	V_4	I_1
	I_2 exit	C_2
	V_6	C_3
start	I_3	C_4
	V_7	
	I_4 exit	

(clipped Polygons)

→ $I_1 V_3 V_4 I_2$

→ $I_3 V_7 I_4$