

TUTORIAL - 8

Ques 1. What is window?

Ans. Window is a graphical control element. It consists of visual area containing some of the graphical user interface of the program it belongs to and is framed by a window decoration. It usually has rectangular shape that can overlap with area of other windows.

Ques 2. What is viewport?

Ans. View port is the visible portion of entire doc. Viewport is the area on a display device to which a window is mapped. (It is the device screen). It is the area expressed in rendering device specific coordinates.

Ques 3. Coordinate of window are known as

- a) Screen coordinates
- b) World coordinates ✓
- c) Device coordinates
- d) Cartesian coordinates

Ques 4. Coordinates of viewport are known as?

- World coordinate
- polar coordinate
- screen coordinate ✓
- Cartesian coordinate

Ques 5. The region against which an object is clipped is called a

- Clip window ✓
- Boundary
- Enclosing rectangle
- Clip square

Ques 6. What is clipping? Give some applications of clipping.

Ans: Its primary use is to remove objects, lines or line segments that are outside a viewing plane. The viewing transformation is insensitive to relative points of viewing volume.

Applications

- Text clipping
- Polygon clipping
- Bitmap graphics

Ans 7. What are the disadvantages of Cohen-Sutherland line clipping algorithm?
 It works only for rectangular clip window which means if the area of interest has any other shape this algorithm fails. Alternatives in this condition is Cyrus Beck and Sutherland Hodgman algorithm.

ADVANTAGES :

- 1) It calculates end points very quickly and rejects and accepts lines quickly.
- 2) It can clip pictures much larger than screen size.

Ques 8. In Cohen-Sutherland clipping the region codes of 2 endpoints 1001 and 0101. The line will be

- i) totally visible not visible
- ii) partially visible
- iii) trivially visible
- iv) can not be determined

taking add as both not in 0000

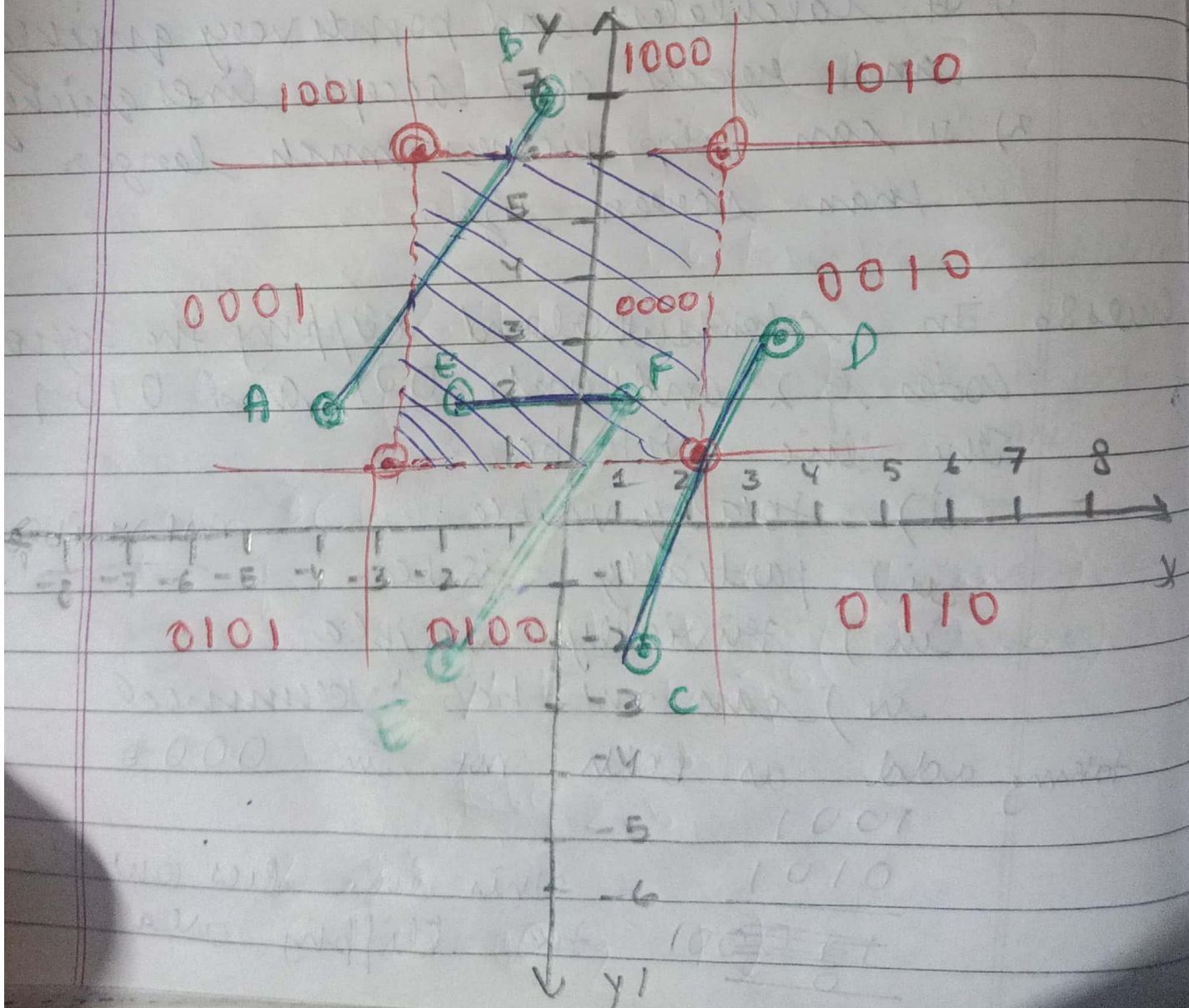
1001
 0101

~~11001~~
 00

This line lies outside the clipping area

Ques 9. The diagonal end point of a rectangular clipping window are $(-3, 1)$ and $(2, 3)$.
Clip the lines

- i) AB with end points $A(-4, 2)$ and $B(-1, 7)$
- ii) CD with end points $C(1, -2)$ and $D(3, 3)$
- iii) EF with end points $E(-2, 2)$ and $F(1, 2)$



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$A \rightarrow 0001$$

$$B \rightarrow 1000$$

$$C \rightarrow 0100$$

$$D \rightarrow 0010$$

$$E \rightarrow 0000$$

$$F \rightarrow 0000$$

no clipping

None of these lines lie completely inside the clipping region so these will be partially visible

A and B

$$\begin{array}{r} 0001 \\ 1000 \\ \hline 0000 \end{array}$$

$$m = \frac{7-2}{4-1}$$

$$= \frac{5}{3} = 1.67$$

C and D

$$\begin{array}{r} 0100 \\ 0010 \\ \hline 0000 \end{array}$$

$$m_{CD} = \frac{3-1}{2-1}$$

$$= \frac{2}{1} = 2$$

as EF lies inside the clipping window no need to do anything on it

$$x' = x + \frac{1}{m} (y - y_1)$$

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

for AB,

$x' = \text{for } A (x_{\max}, y')$

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

$$y' = 2 + 1.67(-3 - (-4))$$

$$y' = 2 + 1.67 \times 1$$

$$y' = 3.67$$

$$A = (-3, 3.67)$$

for B (x', y_{\max})

$$x' = x_1 + \frac{1}{m}(y - y_1)$$

$$x' = -1 + \frac{1}{1.67}(6 - 7)$$

$$= -1 - \frac{1}{1.67}$$

$$= -2.49$$

$$B = (-2.49, 6)$$

for BCD

$$x' = 1 + \frac{1}{2.5}(1 + 2)$$

$$= 1 + \frac{1}{2.5} \times 3$$

$$= 2.2$$

$$C = (2.2, 1)$$

for D (x_{min}, y')

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

$$y' = 3 + 2.5(2 - 3)$$

$$= 3 - 2.5$$

$$= 0.5$$

D $(2, 0.5)$

$\frac{CA}{2}$ New coordinates

A $(-3, 3.67)$

B $(-2.49, 6)$

C $(2.2, 1)$

D $(2, 0.5)$

E and F remains same

E $(-2, 2)$

F $(1, 2)$