

Q1) Explain Bresenham's line drawing algo =)

Bresenham's line drawing algo =)

Step I: Input the start line end point and store the left end point x_1 and y_1 into the frame buffer i.e., for the 1st point

Step II: calculate constants $2dy$, $2dy - 2ax$, ax , ay , $2ay$, $2ay - 2ax$ and obtain starting value of decision parameter $2dy - 4x$.

Step III: at each x along the line starting at $x=0$ perform the following test if $P_k \leq 0$ then next point is to plot (x_{k+1}, y_k) else (x_{k+1}, y_{k+1})

Step IV: repeat step III until $x = x_{end}$

Example

next decision parameter $P_{k+1} = P_k + 2dy - 2ax$.

2. repeat step III until $x = x_{end}$.

Exit $(20, 10)$ ——— $(30, 18)$

$$2ax = 2 \times 2 - 2 \times 1 = 10$$

$$2ay = 2 \times 2 - 2 \times 1 = 8$$

$$2dy = 2 \times 2 = 4$$

$$2ay - 2ax = -4$$

Decision parameter

if $P_k < 0$ $P_{k+1} = P_k + 24y$ (x_{k+1}, y_k)
else $P_{k+1} = P_k + 24y - 24x$ (x_{k+1}, y_{k+1})

$$P_0 = 24y - 4x$$

$$= 16 - 10 = 6$$

$$P_{k+1} = 6 - 4 = 2$$

$$P_{k+1} = 2 - 4 = -2$$

$(20, 10)$	$(24, 13)$	$(28, 16)$
$(21, 11)$	$(25, 14)$	$(29, 17)$
$(22, 12)$	$(26, 15)$	$(30, 18)$
$(23, 12)$	$(27, 16)$	

Q27.

Q.

Explain midpoint circle algorithm?
midpoint circle Algorithm

Steps: I/P radius & center are x_c & y_c
obtain the 1st point on circumference of circle centered on origin as

II Calculate the Initial value of decision parameter as
 $P_0 = x_c^2 - y_c^2 - r^2$

$$\approx 1 - r$$

III at each x_k position starting at $k=0$ perform the following test:

if $(P_k < 0)$

\$ next point along the circle centered on origin is x_{k+1}, y_{k+1}
Decision Parameter

$$P_{k+1} = P_k + 2x_{k+1} + 1$$

else

\$ next point x_{k+1}, y_{k+1}
Decision parameter P .

$$P_{k+1} = P_k + 2x_{k+1} - 2y_{k+1}$$

R Determine Symmetry points in the other 7 octants

for each calculated P_k position on the circular path centered on x_c, y_c is plot the co-ordinate value $x = x_c + x$ and $y = y_c + y$

repeat step 3 to 5 untill $x \geq 1$

Q. $R = 10$ Unit

$$x_c, y_c = (3, 4)$$

$(0, 10)$ $x = 10$ then $(0, 10)$

$$P_0 = 1 - x$$

$$= 1 - 10 = -9 \quad (1, 10)$$

k	P_k	(x_{k+1}, y_{k+1})	$2x_{k+1}$	$2y_{k+1}$	(x_c, y_c)
0	-9	(1, 10)	2	20	(4, 4)
1	-6	(2, 10)	4	20	(5, 4)
2	-1	(3, 10)	6	20	(6, 4)
3	+36	(4, 9)	8	18	(7, 13)

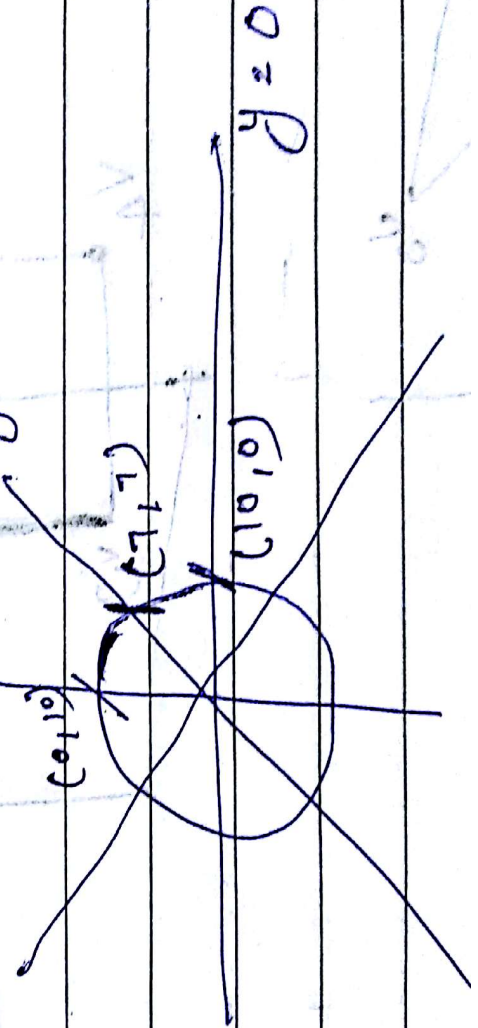
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4	8 -4	(5, 2)	10	18	(8, 13)
5	8 7	(6, 8)	12	16	(9, 12)
6	8 3	(7, 7)	14	14	(10, 11)

$$x=0 \quad y=x$$



Q. 8 Explain DDA algorithm?

Line drawing Algorithm

(1) DDA (2) Bresenham's

(1) DDA (Digital differential algo)

(x_1, y_1)

(x_2, y_2)

line (x_1, y_1, x_2, y_2)

Inbuilt fun.

$$m = \text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

if $(0 < m < 1)$

$$x_{k+1} = x_k + 1$$

$$y_{k+1} = y_k + m$$

else if $(m > 1)$

$$x_{k+1} = x_k + 1/m$$

$$y_{k+1} = y_k + 1$$

else if $(-1 < m < 0)$

$$x_{k+1} = x_k + 1$$

$$y_{k+1} = y_k - m$$

$$m < -1$$

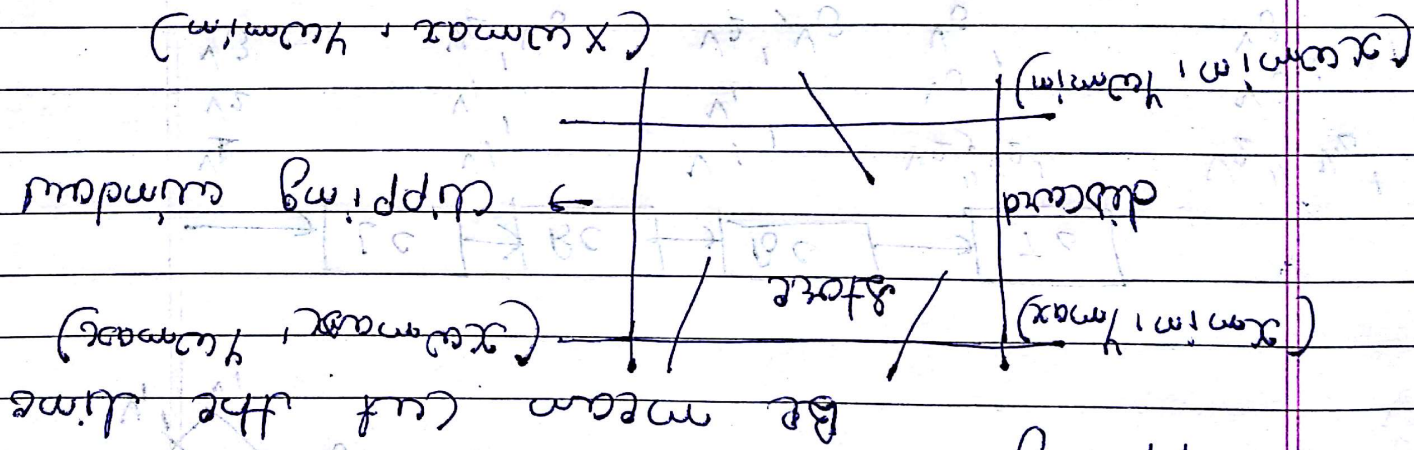
$$x_{k+1} = x_k - 1$$

$$y_{k+1} = y_k + m$$

$$x_{k+1} = x_k + 1$$

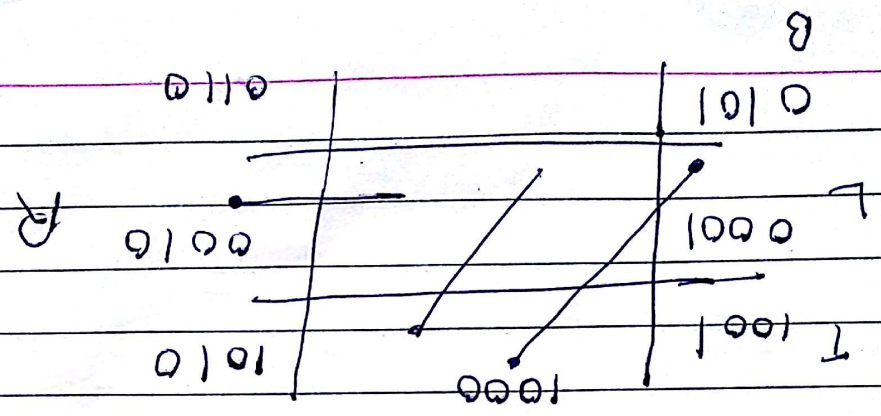
$$y_{k+1} = y_k - 1/m$$

Q.4. Write short notes on clipping :-
 a. Be mean cut the line



Cohen Sutherland line clipping Algo:-

Region code :- T B B L



Sutherland Hodgeman Polygon Clipping Algorithm $\Rightarrow$

