Name: Umme Abira Azmary

ID: 20101539

section : 11.

Ans. to the ques. no - 1:

ⓐ ~~MPL~~ Between DDA and MPL, MPL is an ideal algorithm to draw a line. The reason is, In MPL, line drawing is much faster than DDA ~~and~~

~~Also, D even though DDA solves~~

Also, ~~mid~~ mid point Line does not have multiplication proble-

-m and it also solves the rounding off problem. So, between DDA and MPL algorithm, MPL is preffered.

(b) $y = -2.5x + 10$!

y-axis at A intersection, $x = 0$.

$y = 10$

$\boxed{A(0,10)}$

x-axis at B intersection, $y = 0$.

$0 = -2.5x + 10$

$\Rightarrow -2.5x = -10$

$\Rightarrow \boxed{x = 4}$

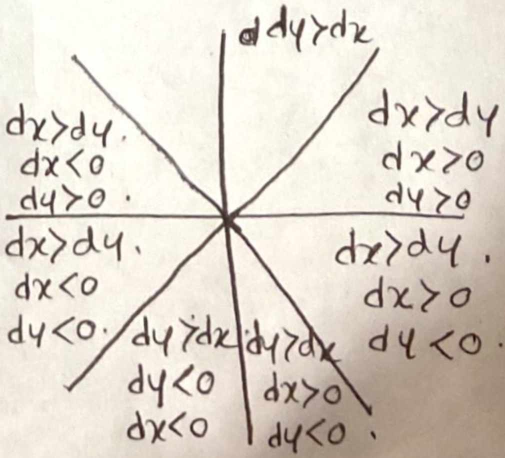
$\boxed{B(4,0)}$

Here, $dx = 4 - 0$

$\boxed{dx = 4}$

$dy = 0 - 10$

$\boxed{dy = -10}$



(i) ~~dx>dy~~ $|dy| > |dx|$

(ii) $dy < 0$

(iii) $dx > 0$.

So, the zone of AB is $\boxed{\text{Zone 6.}}$

for converting into zone 0, $dy > 0$.

$dx > 0$.

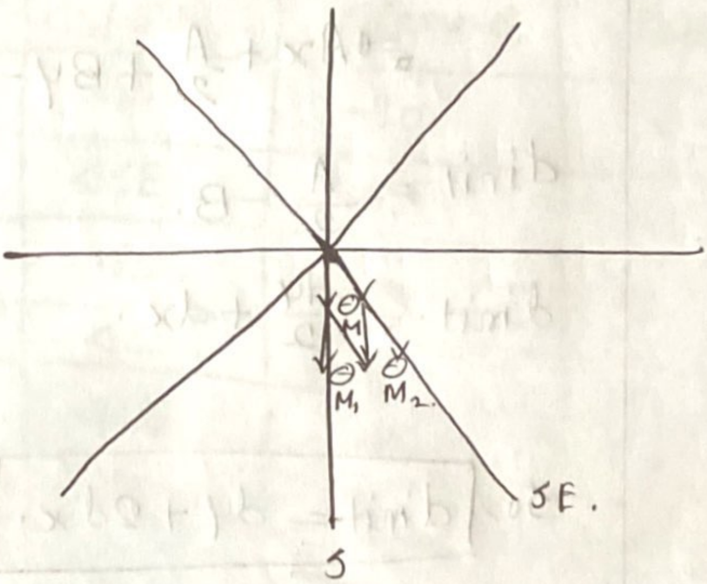
$A(0,10)$ $dx > dy$.

$B(4,0)$.

~~so, dy =~~

so, $\boxed{\begin{array}{l} A'(-10,0) \\ B(0,4) \end{array}}$ endpoints in zone 0.

~~so,~~



Here,

$M(x+\frac{1}{2}, y-1)$

$M_1(x+\frac{1}{2}, y-2)$

$M_2(x+\frac{3}{2}, y-2)$.

$d = A(x+\frac{1}{2}) + B(y-1) + C$

$d_1 = A(x+\frac{1}{2}) + B(y-2) + C$.

$d_2 = A(x+\frac{3}{2}) + B(y-2) + C$.

$\Delta S = d_1 - d$.

$= A(\cancel{x+\frac{1}{2}}) + B(y-2) + \cancel{C} - A(\cancel{x+\frac{1}{2}}) - B(y-1) - \cancel{C}$.

$\Delta S = -B$

$\boxed{\Delta S = dx.}$

For ΔSE, $= d_2 - d_1$

$$= A\left(x+\tfrac{3}{2}\right) + B(y-2) + \cancel{C} - A\left(x+\tfrac{1}{2}\right) - B(y-1) - \cancel{C}$$

$$= A - B.$$

$$\boxed{\Delta SE = dy + dx.}$$

$$d_{init} = A\left(x+\tfrac{1}{2}\right) + B(y-1) + C.$$

$$= Ax + \frac{A}{2} + By - B + C.$$

$$d_{init} = \frac{A}{2} - B.$$

$$d_{init} = \frac{dy}{2} + dx.$$

So, $\boxed{d_{init} = dy + 2dx.}$

$$\boxed{\Delta SE = 2(dy + dx)}$$

$$\boxed{\Delta S = 2dx.}$$

(c) ~~dinit~~

$A = (0, 10)$ $\qquad dx = 4.$

$B = (4, 0).$ $\qquad dy = -10.$

$$\text{dinit} = \frac{-10}{2} + 4.$$

$$= -1 \times 2.$$

$$= -2$$

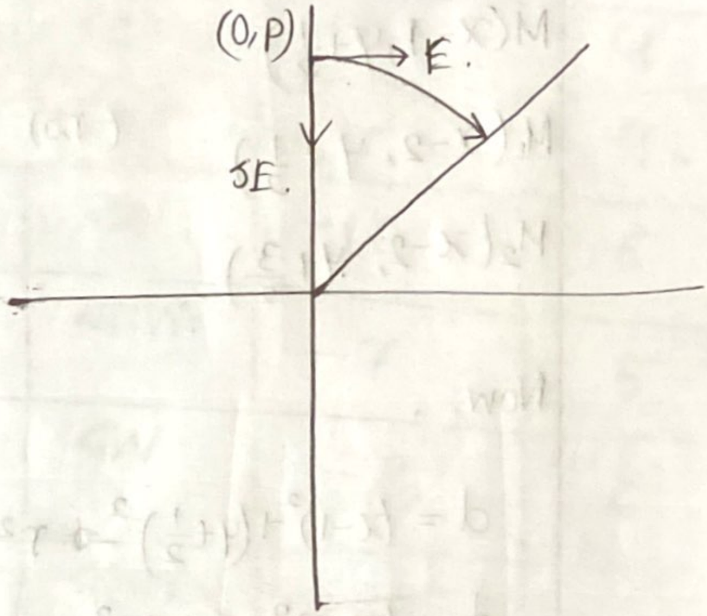
$$\Delta S = 2dx.$$

$$\Delta SE = 2(dy + dx).$$

Pixel	x	y	d	$\Delta S / \Delta SE$	x(zone-0)	y(zone-0).
1	0	10	-2.	ΔS.	-10	0.
2	0	9	6	ΔSE.	-10	-1.
3	1	8	-6	ΔS.	-9	-2.
4	1	7	2	ΔSE.	-8	-4.
5	2	6	-10	ΔSE.	-8	-5
6	2	5.	-2	ΔS.	-8	-6.

Ans. to the ques. no-2:

ⓐ



Chosing East,

$x = 10$.

Chosing South East;

$x = 6$.

$y = P - 6$.

The endpoint is $(16, P-6)$

ⓑ The value of dinit is $1.25 - r$ which can also be written as $\frac{5}{4} - r$.

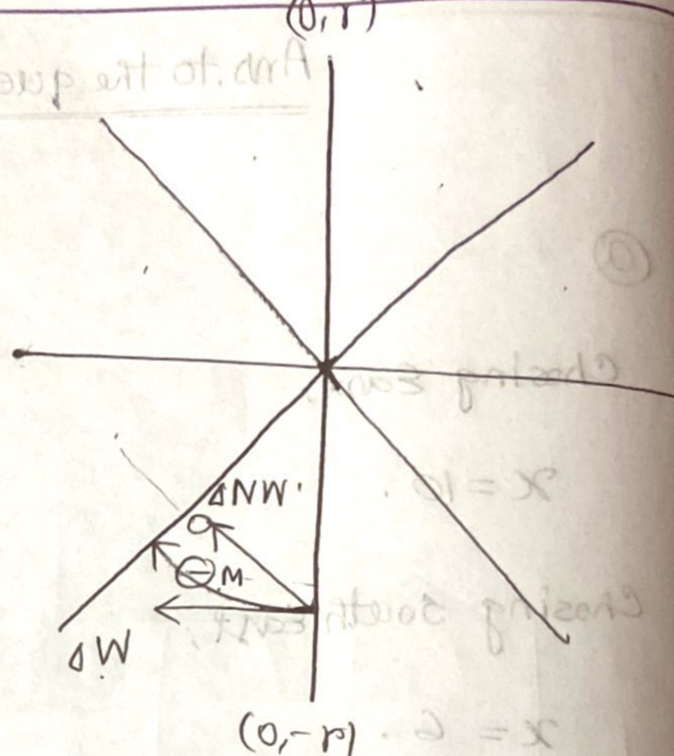
Even though, the value is fraction, ~~it~~ which gives a ~~point~~ floating point, it does not affect the result. Because for Midpoint Circle Drawing Algo, the value of dinit is always same in every zone. However, it is better not to use to avoid floating calculation.

(c).

$M(x-1, y+\frac{1}{2})$

$M_1(x-2, y+\frac{1}{2})$

$M_2(x-2, y+\frac{3}{2})$.



Now,

$$d = (x-1)^2+(y+\frac{1}{2})^2 - r^2.$$

$$d_1 = (x-2)^2+(y+\frac{1}{2})^2 - r^2$$

$$d_2 = (x-2)^2+(y+\frac{3}{2})^2 - r^2.$$

$$\Delta W = (x-2)^2+\cancel{(y+\frac{1}{2})^2}-\cancel{r^2}-(x-1)^2-\cancel{(y+\frac{1}{2})^2}\cancel{+r^2}$$

$$= \cancel{x^2}-4x+4-\cancel{x^2}+2x-1.$$

$$= -2x+3.$$

$$\Delta NW = (x-2)^2+(y+\frac{3}{2})^2-r^2-(x-1)^2+(y+\frac{1}{2})^2+r^2.$$

$$= -2x+2y+5.$$

$$d_{init} = \frac{5}{4} - r$$

$\Delta W = 4(-2x+3)$

$\Delta NW = 4(-2x+2y+5)$.

$d_{init} = (\frac{5}{4} - 9) * 4.$

$= -31.$

pixel	x	y	d	$\Delta W / \Delta NW$	x(circle)	y(circle).
1	0	−9	−31.	ΔW.	−4.	4.
2	−1	−9	−19 ~~−4.85~~	ΔW.	−5.	4.
3	−2	−9	1	ΔNW.	−7	4.
4	−3	−8	−35	ΔW.	−6	5.
5	−4	−8	1	ΔNW.	−7	5.
6	−5	−7.	−11	ΔW.	−8	6.
7.	−6	−7.	41.	ΔNW.	−9	6.
8	−7	~~−7~~ −6	53	ΔNW.	−10.	6.

Ans. to the ques. no-3:

ⓐ (i) $x < x_{min}$.

(ii) $x > x_{max}$.

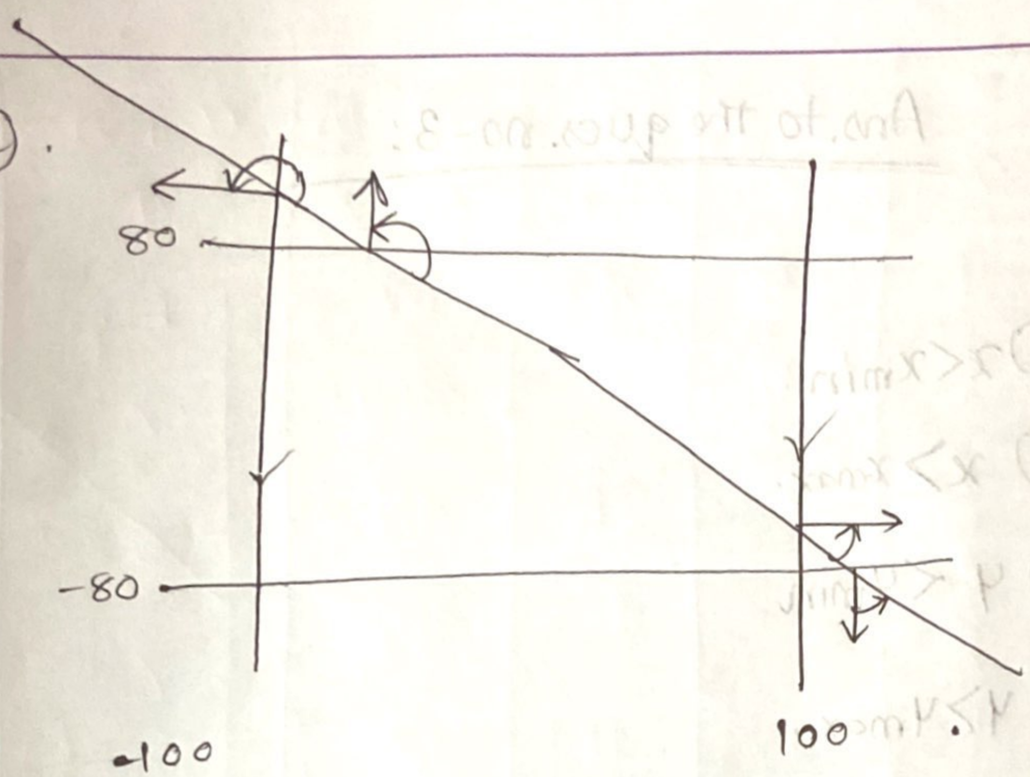
(iii) $y < y_{min}$

(iv) $y > y_{max}$.

ⓑ 6 clippings.

Names are: Near, Far, Top, Bottom, Right, Left.

Ⓒ.



For Top,

$$t_E = \frac{y_{max} - y_0}{y_1 - y_0}$$

$$= \frac{100 - 90}{-88 - 90}$$

$$= -0.056$$

Top Left,

$$t_E = \frac{X_{min} - X_0}{X_1 - X_0}$$

$$= \frac{-100 + 160}{150 + 160}$$

$$= 0.194.$$

For Bottom,

$$t_L = \frac{y_{min} - y_0}{y_1 - y_0}$$

$$= \frac{-80 - 90}{-88 - 90}$$

$$= 0.95$$

For Right,

$$t_L = \frac{X_{max} - X_0}{X_1 - X_0}$$

$$= \frac{100 + 160}{150 + 160}$$

$$= 0.84.$$

$t_{E(max)} = 0.194$.

$t_{L(min)} = 0.84$

As, $t_{L(min)} > t_{E(max)}$

We can draw the line.

Here, Left boundary intersection:

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

$$\cancel{= 80}$$

$$= -88 + (-100 - 150)\left(\frac{y_2 - y_1}{x_2 - x_1}\right).$$

$$\cancel{= 338} = 55.55.$$

Right boundary intersection;

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

$$= -88 + (100 - 150)$$

$$= -59.29.$$

~~The clipping wi~~ The clipping window (55.55, 0) to (0, -59.29, 0).