DDA Line Drawing Algorithm:

- (Digital Differential Analyzer)

- In Screen Consist of pixel. Every pixel Consist of (x, y) values.

DDL Agm used to find the intermediate point.

$$y = mx + c$$

$m \rightarrow$ slope

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

replaced with y_{k+1}, y_k.

Slope $= (x_1, y_1)\ (x_2, y_2)$.

if the 2 points are,

(x_k, y_k) then next point is (x_{k+1}, y_{k+1}) the slope is

$$\boxed{m = \frac{y_{k+1} - y_k}{x_{k+1} - x_k}}$$

$$m = \frac{y_{k+1} - y_k}{x_{k+1} - x_k}$$

x_k → present point

x_{k+1} → next point

To find intermediate point,

In DDA algm to remember 3 cases:

<u>case: 1</u>

if $(m < 1)$

x — unit interval.

changes in

→ $x_{k+1} = x_k + 1$

suffix

$$m = \frac{y_{k+1} - y_k}{\cancel{x_{k+1}} - \cancel{x_k}}$$

1

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

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

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

Case : 2

$m > 1$

y — Unit interval

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

$$m = \frac{\cancel{y_{k+1} - y_k}}{x_{k+1} - x_k}$$

$$m = \frac{1}{x_{k+1} - x_k}$$

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

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

Case : 3

$m = 1$

x & y → Unit interval.

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

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

Base on those formula to find out remaining points.

DDA:

1. Calculate slope, m.

2. if $m<1$

x – changes in unit interval
y – moves ~~wind~~ with deviation.

$$(x_{k+1}, y_{k+1}) = (x_k+1, y_k+m).$$

3. if $(m>1)$

x moves with deviation
y moves in unit intervals

$$(x_{k+1}, y_{k+1}) = (x_k + 1/m, y_k + 1)$$

4. if $m=1$

x & y moves in unit intervals. $(x_{k+1}, y_{k+1}) =$

$$(x_k+1, y_k+1).$$

Example:

(0, 0) & (4, 5) → end point.
└ starting point.

$$m = \frac{5-0}{4-0} = 5/4.$$

$$5/4 > 1.$$

y → moves in unit interval.

$y \rightarrow x_k + 1/m$

$$(x_{k+1}, y_{k+1}) = (x_k + 1/m, y_k + 1)$$

$$\boxed{\begin{aligned} x_{k+1} &= x_k + 1/m. \\ y_{k+1} &= y_k + 1. \end{aligned}}$$ → calcule $1/m$.

$$m = 5/4.$$

$$1/m = \frac{4}{5} = \boxed{0.8}$$

x	y	x-plot	y-plot	(x, y)
0	0	0	0	(0, 0)
0.8 (0+.8)	1	Round 0.8 1	1	(1, 1)
1.6 (.8+.8)	2	Round 2 upper boundry	2	(2, 2)
2.4	3	2	3	(2, 3)
3.2	4	3	4	(3, 4)
4	5	4	5	(4, 5)

0,0 $\boxed{(1,1)\ (2,2)\ (2,3)\ (3,4)}$ (4,5)

Draw back:

* Every iteration apply the Round Function.
* Increase the Computation.