

# Bresenham's Line Drawing

①

$$P(\text{decision parameters}) = 2dy - dx$$

↳ used for avoiding floating point.

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

where  $dy = y_2 - y_1$  &  $dx = x_2 - x_1$

Case 1: ( $m < 1$ )		else case 2: ( $m \geq 1$ )	
$P < 0$	else $P \geq 0$	$P < 0$	else $P \geq 0$
$x = x + 1$	$x = x + 1$	$y = y + 1$	$x = x + 1$
$P = P + 2dy$	$y = y + 1$	$P = P + 2dx$	$y = y + 1$
	$P = P + 2dy - 2dx$		$P = P + 2dx - 2dy$

## Algorithm :-

Step 1: Accept two end points  $(x_1, y_1)$  and  $(x_2, y_2)$  & store only  $(x_1, y_1)$  as starting pt.

Step 2: PLOT  $(x_1, y_1)$

Step 3: Calculate slope of line  $m$

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

Step 4: Calculate decision Parameter

$$P = 2dy - dx$$

Step 4: If  $m < 1$

if  $P < 0$

then  $x = x + 1$

$$P = P + 2dy$$

else

$$x = x + 1,$$

$$y = y + 1$$

$$P = P + 2dy - 2dx$$

else

if  $P < 0$

then  $y = y + 1$

$$P = P + 2dx$$

else

$$x = x + 1$$

$$y = y + 1$$

$$P = P + 2dx - 2dy$$

stop.

Ques Which raster locations would be chosen by Bresnham's Algorithm when scan converting a line from (1,1) to (8,5).

Sol<sup>n</sup>

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{dy}{dx} = \frac{5-1}{8-1} = \frac{4}{7} < 1$$

$dy = 4$   
 $dx = 7$

Now find  $P = 2dy - dx$

$$= 2 \times 4 - 7$$

$$= 8 - 7 = 1$$

Here  $m < 1$  but  $P > 0$

P	x	y
$2dy - dx = 1$ So apply $P > 0$	1	1
$P = P + 2dy - 2dx$ $= 1 + 2 \times 4 - 2 \times 7$ $= 1 + 8 - 14 \Rightarrow 9 - 14$ $\Rightarrow -5$ Apply $P < 0$	2	2
$P = P + 2dy \Rightarrow -5 + 2 \times 4$ $= -5 + 8 = 3$ Apply $P \geq 0$	3	2
$P = 3 + 8 - 14$ $= -3$ Apply $P < 0$	4	3
$P = -3 + 8 = 5$ Apply $P \geq 0$	5	3
$P = 5 + 8 - 14 = -1$ Apply $P < 0$	6	4
$P = -1 + 8 = 7$ Apply $P \geq 0$	7	4
No need to solve as we get final points.	8	5

initial points.

final points.