Scan Converting a Straight line

There are 5 methods :-

1. Direct Method
2. Simple DDA (Digital Differential Analyzer)
3. Incremental DDA
4. Integer DDA .
5. Bresenham's line Drawing

given (x_1, y_1) (x_2, y_2)

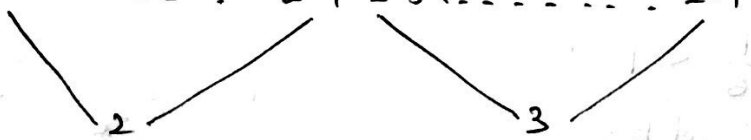
Now you have to draw a line with scales.

$(2,3)$ $(5,6)$ &

But with computer scale it is not possible in CG you need in between points. Computer can understand integer value (pixel value is only integer value).

So we can change decimal value into integer value.

Suppose 2.1 ..... 2.4 2.5 ..... 2.9



Also, These ~~are~~ lines are like zig-zag way

But in pixel are very close to  computers that we can't identify zig-zag line. we only see straight line.

Direct Method : Find all the values of x & y b/w the end points. ~~Suppose~~

Eq of line 1) $y = mx + b$

2) slope m → It means whether line is bend to x axis or y axis.

3) b = y intercept.

Now we have to find inbetween points
So that we can join a line using

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

For ex : $(x_1, y_1) = (3, 4)$
$(x_2, y_2) = (9, 5)$ } given.

Now find $m = \frac{5-4}{9-3} = \frac{1}{6} < 1$

There are 2 cases when $m \leq 1$ or $m > 1$

when $m \leq 1$	$m > 1$
we will keep incrementing x axis $x = x+1$ $y = mx+b$ find y.	we will keep incrementing y axis $y = y+1$ $y = mx+b$ Find x ? $x = \frac{y-b}{m}$

Here $m = \frac{1}{6} < 1$.

Now find b = ?

$y = mx + b$

$b = y - mx_b$

$= y_1 - mx_1$

$= 4 - \frac{1}{6} \times 3$.

$= 4 - \frac{1}{2} = \frac{8-1}{2} = 7/2$.

$m = \frac{1}{6}$
$b = 7/2$

Now increment the value of x.
when $x = 4$ find y ?

$y = mx + b$

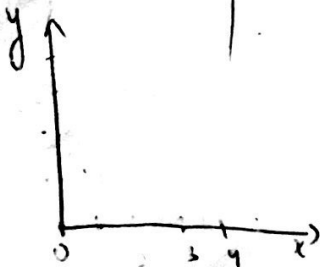
$= \frac{1}{6} \times 4 + 7/2 = \frac{4+21}{6} = \frac{25}{6} = 4.17 = 4$

Now again $x = 4+1 = 5$

$y = mx + b$

$= \frac{1}{6} \times 5 + \frac{7}{2} = \frac{5}{6} + \frac{7}{2} = \frac{5+21}{6} = \frac{26}{6} = 4.33 = 4.$

x	y	
3	4.	given.
4	4.17 = 4.	
5	4.33 = 4.	
6	4.50 = 5	
7	4.66 = 5	
8	4.83 = 5	
9	5	given



for ex $(x_1, y_1) = (1,1)$

$(x_2, y_2) = (8,5)$

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

$y = mx + b$

$b = y - mx$

$= y_1 - mx_1$

$= 1 - \frac{4}{7} \times 1$

$= \frac{7-4}{7} = \frac{3}{7}$.

$m = \frac{4}{7}$, $b = \frac{3}{7}$

< 1.

So $x = x+1$

x	y
1	1
2	1.5 = 2
3	2.14 = 2
4	2.71 = 3
5	3.2 = 3
6	3.8 = 4
7	4.4 = 4
8	5

Put $x = 2$. find y

$y = mx + b$

$= \frac{4}{7} \times 2 + \frac{3}{7}$

$y = \frac{8}{7} + \frac{3}{7} = 1.5 = 2$

Put $x = 3$ $y = mx + b$

$= \frac{4}{7} \times 3 + 3/7$

$= \frac{12}{7} + \frac{3}{7} = \frac{15}{7} = 2.14$

Put $x = 4$

$y = mx + b$.

$y = \frac{4}{7} \times 4 + 3/7$

$= \frac{16}{7} + \frac{3}{7} = 2.71$

Put $x = 5$

$y = mx + b$

$= \frac{4}{7} \times 5 + \frac{3}{7} = \frac{20}{7} + \frac{3}{7} = 3.2$

Put $x = 6$

$y = mx + b$

$= \frac{4}{7} \times 6 + \frac{3}{7}$

$= \frac{24+3}{7} = 3.8$

Put $x = 7$

$y = mx + b$

$= \frac{4}{7} \times 7 + \frac{3}{7}$

$= \frac{28+3}{7} = 4.4$