CG test - 4

(2) The drawback of using DDA are:

→ Uses floating point approximation, hence inaccurate

→ Can lead to a graph looking like a ladder in a longer span.

Given: $(x_1, y_1) = (17, 2)$ $(x_2, y_2) = (10, 5)$

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{3}{7}$$

$|m| < 1$

if $P_k < 0$ then	$P_k \geq 0$ then,
$x_{k+1} = x_k - 1$	$x_{k+1} = x_k - 1$
$y_{k+1} = y_k - 1$	$y_{k+1} = y_k + 1$
$P_k = P_k + 2\Delta y$	$P_k = P_k + 2\Delta y - 2\Delta x$

Here

$\Delta x = 7$, $2\Delta x = 14$, $\Delta y = 3$, $2\Delta y = 6$

Initial decision parameter $(P_{k+1}) = 2\Delta y - \Delta x = 6 - 7 = -1$

for starting point $(17, 2)$

k	P_0	x_{k+1}	y_{k+1}	x_{k+1}, y_{k+1}
0	-1	16	2	(16, 2)
1	5	15	3	(15, 3)
2	-3	14	3	(14, 3)
3	3	13	4	(13, 4)
4	-8	12	4	$(12\frac{2}{3}, 4)$
5	-2	11	4	(11, 4)
6	4	10	5	(10, 5)

Scaling transformation is a linear transformation, that scales the size of the object.

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To prove: Two successive scaling are multiplicative:

Let, points be scaled by S_x, S_y

Let P be scaled by the scaling factors S_{x_2}, S_{y_2} to point, then combined transformation can be observed as.

$$T = S(S_{x_2}, S_{y_2})(S_{x_1}, S_{y_1})$$

$$= \begin{bmatrix} S_{x_2} & 0 & 0 \\ 0 & S_{y_2} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} S_{x_1} & 0 & 0 \\ 0 & S_{x_1} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} S_{x_1} S_{y_2} x_2 & 0 & 0 \\ 0 & S_{y_1} S_{y_2} & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

∴ This proves two scaling are multiplicative.

Given

A(0,0,0) B(1,1,0) C(1,2,2) D(0,2,0)

For rotating +90°

$$\begin{bmatrix} x' \\ y' \\ z' \\ 1 \end{bmatrix} = \begin{bmatrix} \cos 90 & 0 & \sin 90 & 0 \\ 0 & 1 & 0 & 0 \\ -\sin 90 & 0 & \cos 90 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ 4 \\ 2 \\ 1 \end{bmatrix}$$

Now to reflecting on y-z plane. -

↳ x chages ; yz unchaged

$$R_{y.yz} = \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Coordinates after reflecting about y-z plane is

A''(0, 0, 0) B''(0, 1, -1) C''(2, 2, -1) D''(0, 2, 0)

(3) window: A area selected for display from real world is called a window.

viewport: It is a area on display device to which window is displayed.