Date

Dec 2015

(1) Which of following graphics primitives are considered as the basic building blocks of computer graphics

(a) Points (b) Lines (c) Polylines (d) Polygons

(2) Which of following are principle components of a memory tube display?

(a) Flooding gun (b) collector (c) phosphorus grains (d) Ground

(3) Which raster locations would be chosen by Bresenhom algorithm when scan converting a line from (1,1) to (8,5)

(1) $\Delta x = x_2 - x_1 = 7$

$\Delta y = 5 - 1 = 4$

(3) $P_{k+1} = 2\Delta y + P_k$ if < 0

(4) $P_{k+1} = 2\Delta y - 2\Delta x + P_k$ if ≥ 0

$2\Delta y - 2\Delta x = 2 \times 4 - 2 \times 7 = 8 - 14 = -6$

(2) $P_0 = 2\Delta y - \Delta x = 2 \times 4 - 7 = 1$

K	P_k	x_{k+1}, y_{k+1}
0	$P_0(6) > 0$	2, 2
1	$-6+1 = -5 < 0$	3, 2
2	$8-5 = 3 > 0$	4, 3
3.	$-6+3 = -3 < 0$	5, 3
4.	$8-3 = 5 > 0$	6, 4
5	$-6+5 = -1 < 0$	7, 4
	$-1+8 = 7 > 0$	8, 5

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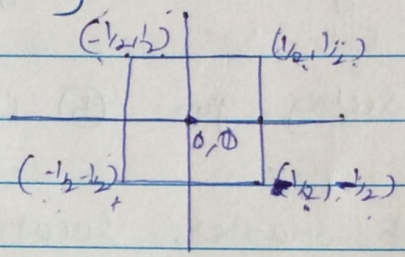
(4) Consider a unit square centred at origin. The co-ordinates of square are translated by a factor $(\frac{1}{2}, 1)$ and rotated by an angle of 90°. what shall be co-ordinates of new square

$(-\frac{1}{2}, 0)$ $(-\frac{1}{2}, 1)$ $(-\frac{3}{2}, 1)$ $(-\frac{3}{2}, 0)$



$t_x = \frac{1}{2}$, $t_y = 1$

$A' = (0, 1)$, $B' = (0, 2)$

$C' = (-1, 2)$ $D' = (-1, 1)$

$$A' = \begin{bmatrix} \cos 90 & -\sin 90^\circ \\ \sin 90^\circ & \cos 90 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix} = -1$$

2x2 2x1

$$A' = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 1/2 \\ 1/2 \end{bmatrix} = \begin{bmatrix} -1/2 \\ 1/2 \end{bmatrix}$$

$(0, 3/2)$

$(1, 3/2)$

$(0, 1/2)$

~~$(-1/2, 1/2)$~~

$(1, 1/2)$

$$\begin{bmatrix} 1 \end{bmatrix}$$

$x' = x\cos\theta - y\sin\theta$

$y' = x\sin\theta + y\cos\theta$

$0 \quad 3/2$

$(-3/2, 0)$

$(-3/2, 1)$

$(-\frac{1}{2}, 0)$

~~$(-3/2, 1)$~~

$x' = -y$

$y' = x$

$(-\frac{1}{2},)$

June 2016

$\cos 90^\circ = 0$
$\sin 90^\circ = 1$

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① Bresenham Circle generating algo for first quadrant is

$x_c, y_c = (30,30)$
$r = 10$ (0,30)
$x = 0$
$y = r = 30$

(1) $x = 0 \quad \Delta y = r$

$P_0 = 3 - 2r$

when $P < 0$ then

$P_{k+1} = P_k + 4x + 6, \quad x = x+1$

$P \geq 0$ then

$P_{k+1} = P_k + 4(x-y) + 10, \quad x = x+1$
$y = y - 1$

② A point (5,1) is rotated by 90° about a pivot point (2,2). what is the coordinate of new transformed point P'

$$x' = x_r + (x - x_r)\cos\theta - (y - y_r)\sin\theta$$
$$y' = y_r + (x - x_r)\sin\theta + (y - y_r)\cos\theta$$

$x' = 2 + (5-2)\cos 90^\circ - (1-2)\sin 90^\circ$
$x' = 2 + 3\cos 90^\circ - (-1)\sin 90^\circ$
$x' = 2 + 3*0 - (-1)(1) = 2 + 1 = 3$

$y' = 2 + (3)\sin 90^\circ + (-1)\cos 90^\circ$
$= 2 + 3(1) + (-1)*0$
$= 2 + 3 = 5$

$(x', y') = [3, 5]$

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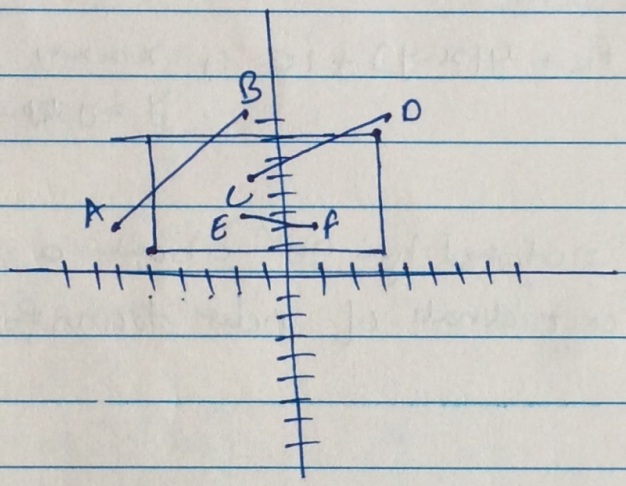
(3) Rectangle window has lower left hand corner at (-5,1) & upper right hand corner (3,7)

AB A (-6,2) B(-1,8)

CD C(-1,5) D(4,8)

EF E(-2,3) F(1,2)

Which of following are candidate for clipping

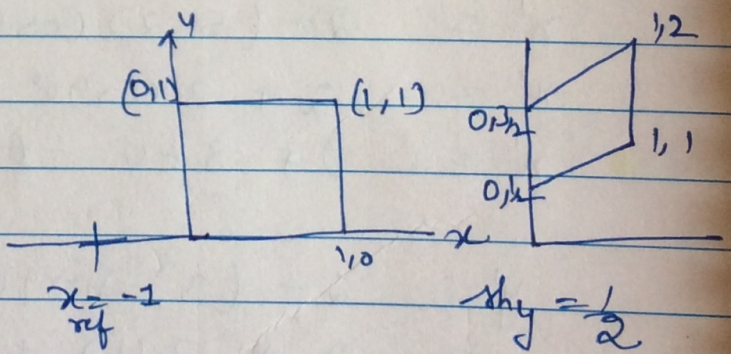


✓ AB & CD

(4) A y direction shear relative to line $x = x_{ref}$

$x' = x$,

$y' = sh_y(x - x_{ref}) + y$



x direction shear relative to line $y = y_{ref}$ $x_{ref} = -1$

$x' = sh_x(y - y_{ref}) + x$

$y' = y$

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(5) (1) Hermite curve are generated using the concepts of interpolation

(2) Bezier curve are generated using the concept of approxim

(3) The Bezier curve lies entirely within the convex hull of its control points.

(4) The degree of Bezier curve does not depend on the number of control points.

June 2014

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① Which of following is not true

T (a) The beam penetration is used with random scan monitor

T (b) Shadow mask is used in raster scan system

F (c) Beam penetration method is better than Shadow Mask Method

T (d) Shadow Mask method is better than beam penetration Meth

② Line caps are used for adjusting the shape of line ends to give them a better appearance. various kinds of line caps used are

(a) Butt cap & Sharp cap

(b) Butt cap & round cap

(c) Butt cap & sharp cap & round cap

✓ (d) Butt cap, round cap, projecting square cap

③

(a) Line	Type, Size, Color
(b) Fill Area	Color, Size, Font
(c) Text	Style, Color, Pattern
(d) Marker	Type, Width, Color

④ Which of following Color Models are defined with three primary colors?

(a) RGB & HSV

(b) CMY & HSV

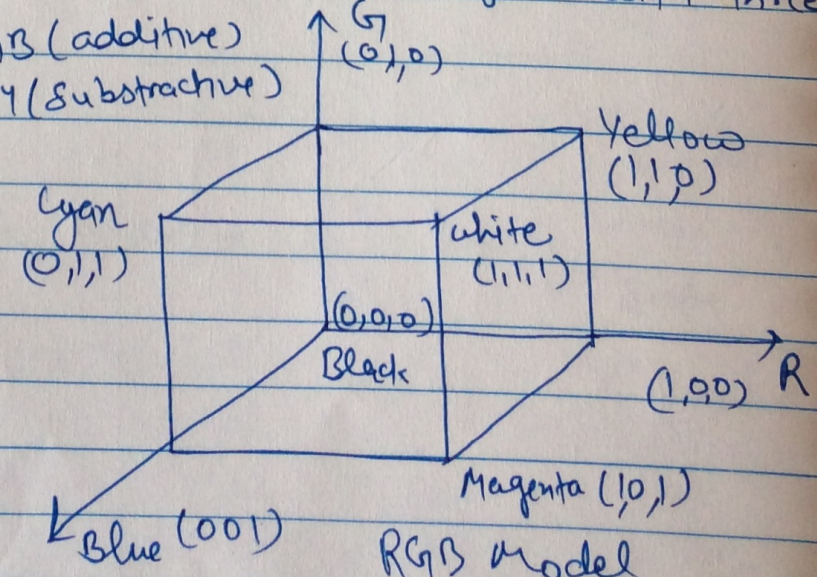
(c) HSV & HLS

✓ (d) RGB & CMY

RGB (additive)

CMY (Substractive)

$$\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} - \begin{bmatrix} C \\ M \\ Y \end{bmatrix}$$



RGB Model

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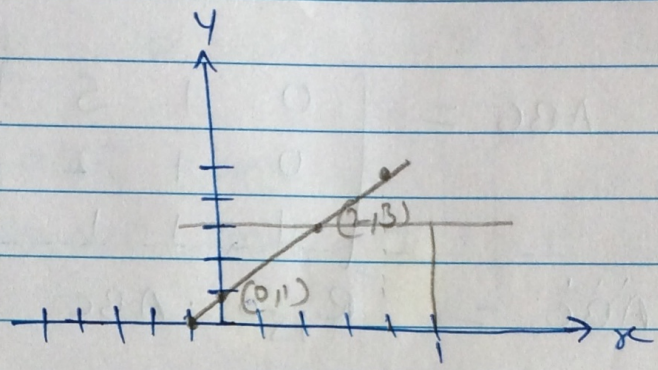
(5) Consider a window bounded by the lines $x=0$; $y=0$; $x=5$ & $y=3$. The line segment joining $(-1,0)$ & $(4,5)$, if clipped against this window will connect the points

(a) $(0,1)$ & $(2,3)$

(b) $(0,1)$ & $(3,3)$

(c) $(0,1)$ & $(4,3)$

(d) $(0,1)$ & $(3,2)$



of AB are end pt of line.

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(2) Match following →

(a) Tablet, joystick → continuous devices
(b) Light Pen, Touch Screen → Direct device
(c) Locator, ~~Touch Screen~~ keyboard → logical device
(d) Data Globe, Sonic Pen → 3D interaction device

(3) Match following →

(a) Cavalier projection → The DOP is chosen so that there is no foreshortening of lines ⊥ to the xy plane
→ oblique projection
(b) Cabinet Projection → The DOP is chosen so that lines ⊥ to the xy planes are foreshortened by half their length
(c) Isometric Projection (Axonometric) → The DOP makes equal angles with all of principal axis
(d) Orthographic Projection → Projections are characterized by fact that the DOP is ⊥ to the view plane.

Map plane
90°
>90° (oblique)

(4) A technique used to approximate halftones without reducing spatial resolution is known as
(a) Halftoning
(b) Dithering ✓
(c) Error diffusion
(d) none of above

halftone image is usually made up of a series of dots rather than a continuous tone. These dots are of different sizes. Larger dots are used

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represent darker, smaller dots are used for lighter area. These dots are arranged in pattern that form 45° screen angle with horizon. which have only two colors to display

for eg resolution 800 by 600 pixel, 2x2 half tone reproduction of image would effectively reduce this resolution to 400 by 300 megapixel.

Dithering → (1) thresholding / uniform quantization
(2) Error diffusion
(3) Ordering Dithering

Que Compute size = 640 x 480 image at 240 pixels per inch

$\frac{640}{240} \times \frac{480}{240} = 2\frac{2}{3} \times 2$ inches

Que Compute resolution of 2x2 inch image that has 512 x 512 pixel

Ans $\frac{512}{2} \times \frac{512}{2} = 256 \times 256$ / 256 pixel per inch.

Que resize a 1024 x 768 image to one that is 640 pixel wide with same aspect ratio, what would be the length of resized image?

Ans $A \cdot R = \frac{\text{With}}{\text{high}} = \frac{1024}{768} = \frac{640}{\text{height}}$

$\text{Height} = \frac{640 \times 768}{1024} = 480$

Que 512 x 512 cut from center of 800 x 600, co-ordinates of pixel in large image that is at lower left corner of small image?

Run length coding technique used for data compression

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Ans (800-512)/2 , (600-512)/2 = 144, 144