Northern University Bangladesh

Clearance for Assessment

Student ID.: 04180301280

Semester: Fall 2021

Student Name: Md Labib Arefin

Enrolled Semester: 10

Program: Bachelor of Science in Computer Science and Engineering (CSE)

Course Code	Course Title	Credit Hour	Section	Remarks
CSE 3124	Microprocessor and Assembly Language Programming	3.0	A	
CSE 3171	Microprocessor and Assembly Language Programming Lab Work	1.0	A	
CSE 4278	Computer Graphics and Multimedia System Design	3.0	B	
CSE 4288	Computer Graphics Lab work	1.0	C	
CSE 4351	Image Processing and Computer Vision	3.0	A	
CSE 4355	Artificial Intelligence and Expert System	3.0	B	
CSE 4383	Image Processing and Computer Vision Lab Work	1.0	A	
CSE 4385	Artificial Intelligence and Expert System Lab Work	1.0	B	

Valid for Mid Term Assessment, Fall 2021

①

Answer according to Question No. 1

04180301280

Md Labib Aretin.

i) Graphics monitors are usually constructed with a persistance in range from 0 to 70 ms.

→ False. It is 10 to 60 ms.

ii) Picture definition is stored in a memory buffer are called bitmap buffer

→ It is true. A bit map buffer is also called frame -buffer

iii) By arranging intensity of pixel may lead to a remedy for alliasing

→ True False True.

iv) Using vector property can reduce the computational cost for 2D transformation.

→ True

v) Circle and ellipse both have 8-symmetry

→ false. Circle has 8-symmetry.

vi) Composite Transformation of scaling -transformation is cumulative

→ False

(v)

vii) composite transformation of rotation - translation is commutative.

→ True

viii) for a line with m = 1, the incremental method and mid line algo. ar both computationally same

→ True.

ix) Mid circle algo. finds all the points along a circle at circumference excepts the points on $y = x = 0$
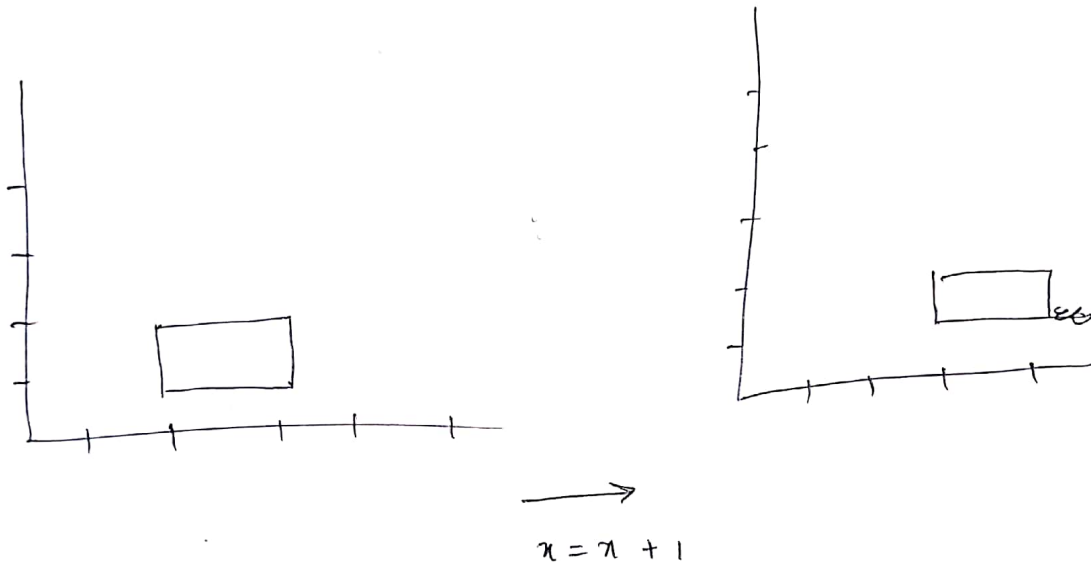
→ True

x) If both the radius of an ellipse is equal, we need not to consider the two regions separately in first quadrant

→ false

a) The fundamental geometric 2D transformation are:

i) Translation

$$
\begin{pmatrix} Q_x \\ Q_y \\ 1 \end{pmatrix} = \begin{bmatrix} P_x + m_{13} \\ P_y + m_{23} \\ 1 \end{bmatrix} \rightarrow \begin{pmatrix} Q_x \\ Q_y \\ 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & m_{13} \\ 0 & 1 & m_{23} \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} P_x \\ P_y \\ 1 \end{pmatrix}
$$

$$x = x + 1$$

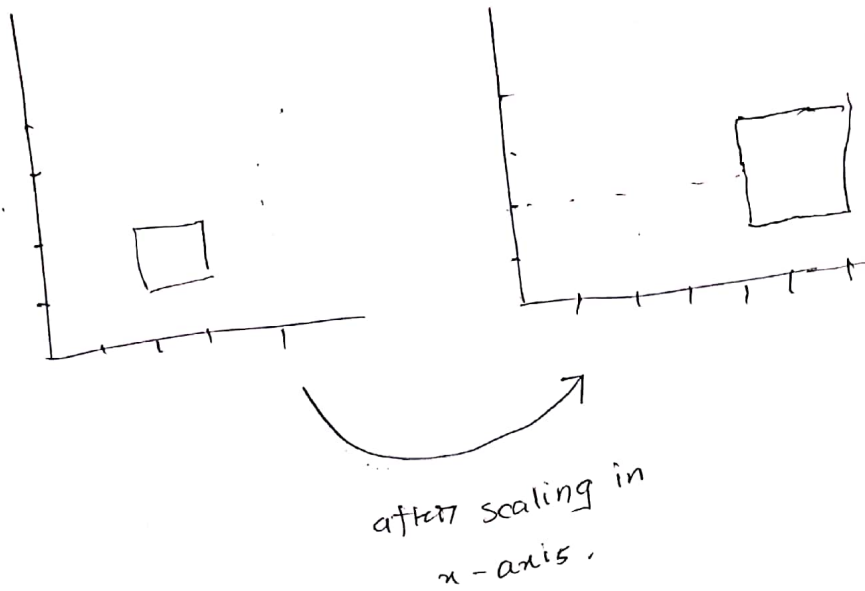It is the movement of object without deformation. Every point is translated by same amount

ii) Scaling

$$(Q_x, Q_y) = (S_x P_x, S_y P_y)$$

$$\downarrow$$

$$
\begin{pmatrix} Q_x \\ Q_y \\ 1 \end{pmatrix} = \begin{pmatrix} S_x & 0 & 0 \\ 0 & S_y & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} P_x \\ P_y \\ 1 \end{pmatrix}
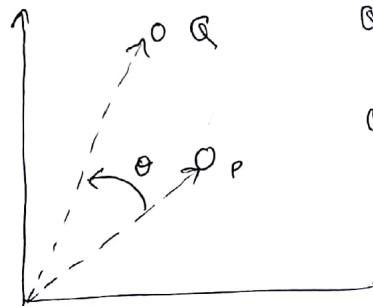$$

after scaling in
x - axis.

It is a process of modifying the size of objects. It may be used to increase / reduce the size of an object.

If $T_1 = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$, If (x_1, y_1) is original position and T_2 is translation vector then (x_2, y_2) are coordinated as after scaling
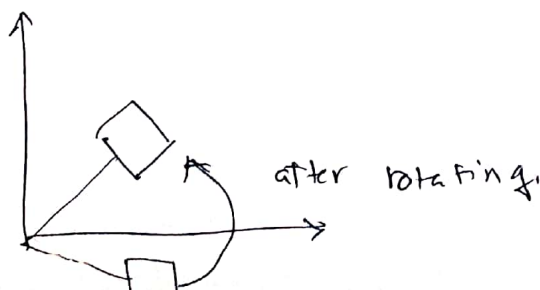
$$[x_2 \ y_2] = [x_1 \ y_1]\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} = [2x_1 \ 2y_1]$$

Rotation

$Q_x = P_x \cos \theta \theta - P_y \sin \theta$
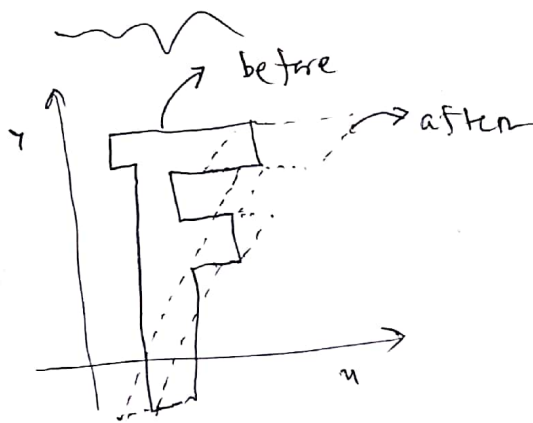
$Q_y = P_x \sin \theta + P_y \cos \theta$

after rotating.

$$\begin{pmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

It is a transformal operation. That means it is a conversation from one coordinate space into another.

Sile Shearing

$$Q_x = P_x + h\,P_y$$

$$Q_y = P_y$$

$$\downarrow$$

$$\begin{pmatrix} 1 & h & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Sheare along x

$$Q_x = P_x$$
$$Q_y = g\,P_x + P_y \quad \rightarrow \quad \begin{pmatrix} 1 & 0 & 0 \\ g & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \rightarrow$$
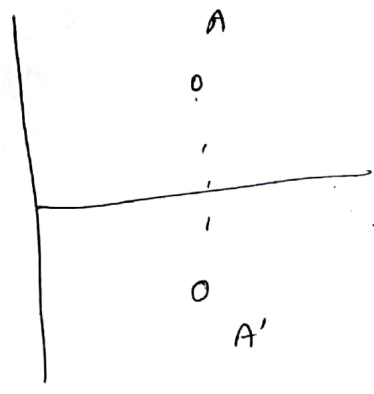
sheare along y

jects. It
re t.

ition an
coordi

shearing : It is an ideal technique to change the shape of an existing object in 2D plane. The object size can be changed along u and Y direction.
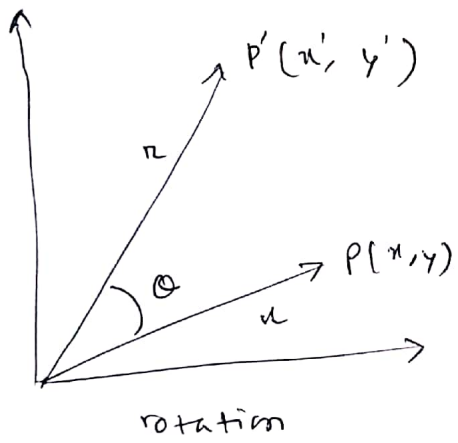
Reflection

A

0

|

|

|

O
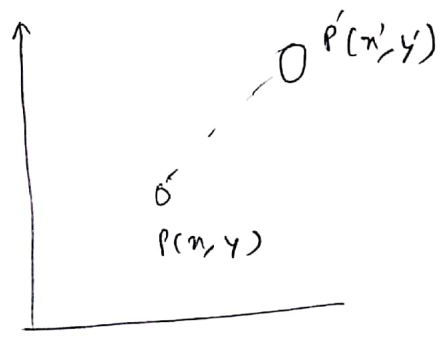
A'

It is used to emulative reflective objects like mirrors or and shiny surfaces

b) The two examples are rotation and translation

$P'(x', y')$

r

θ

$P(x, y)$

u

rotation

$P'(x', y')$

δ'

$P(x, y)$

translation,

. It

and

ordinate
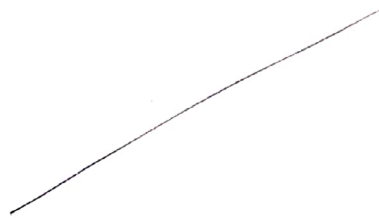
c)

Answer according to Question No. 4

b) Analog devices such as random scan display or a vector plotter, display a straight line smoothly from one endpoint to another. Linearly varying horizontal and vertical deflection voltages are generated that are proportional to required changes in x and y direction to produce smooth line.

Suppose I want to draw a line from $(1,1)$ to $(8,4)$ with rectangular edges

'A' 'B'
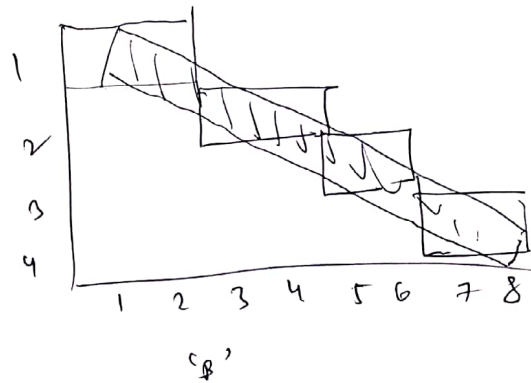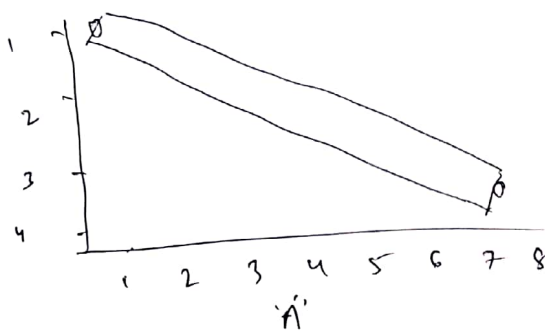
The ideal line would be fig A, line needs to go through a process called Rasterization which would define color of pixels.

It can be done by Bresenham's algo, draw lines as it extremly quickly, but it does not perform anti aliasing.

It can't handle any cases where endprints don't lie exactly on integer points of pixel grid.

a) In mid point circle algo,

$$f_{circle} (x,y) \cdots < 0, \text{ if } \varphi(x,y) \text{ is insid the circle bundary}$$

$$(x,y) = 0, \text{ if } \varphi(x,y) \text{ is on circle bundry}$$

$$(x,y) > 0, \text{ if } (x,y) \text{ is outside the circle bundary}.$$