EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF MATHEMATICS
EXTERNAL DEGREE EXAMINATION IN SCIENCE –2009/2010
THIRD YEAR FIRST SEMESTER (Apr./ May , 2016)
EXTCS 301 – COMPUTER GRAPHICS
(REPEAT)

wer all Questions **Time: 2 Hours**

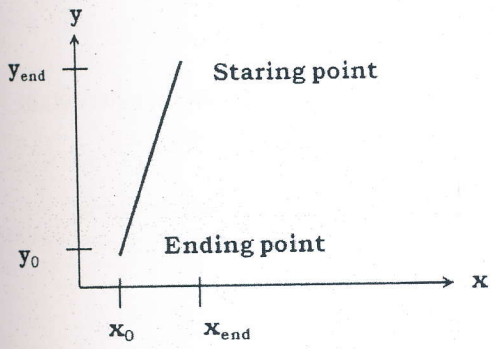
i) Define in your own words what a Computer Graphics is.

ii) Define the following terms:

a) Modeling co-ordinates;

b) Normalized co-ordinates.

iii) Derive the necessary equations to generate Digital Differential Analyzer (DDA) Algorithm to the following case:



Here the slope m is greater than one (m > 1).

iv) Consider the Midpoint circle algorithm:

a) Derive the necessary equations to generate **Midpoint circle** algorithm.

b) Write the **Midpoint circle** algorithm.

c) Get all the pixel co-ordinates to draw a circle of radius r = 9 with center (3, 4).

(**Apply this algorithm**)

Plot all the pixel co-ordinates to draw this complete circle.

Q2)

i) Give the corresponding ***matrices*** (in homogeneous system) for each of the follo D transformations in computer graphics:

a) Rotation about pivot point;

b) Translation;

c) Scaling about origin;

d) Shearing in x-direction.

ii) Consider the squares shown below as Figure-1 and Figure-2.

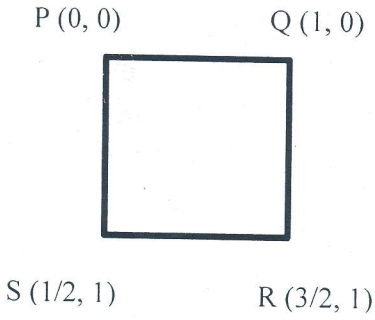


Figure-A

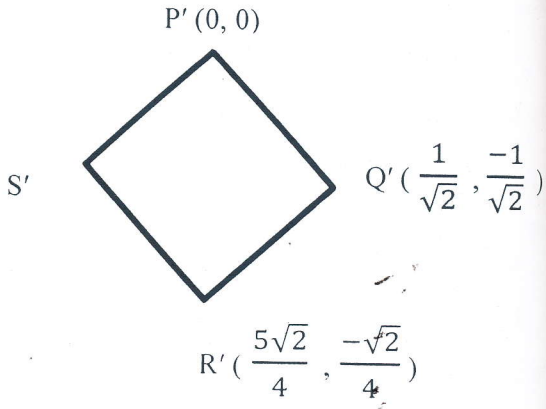


Figure -B

a) Write down the steps and corresponding transformation matrices to obtain ***Figure-B*** from ***Figure -A***;

b) Compute the co-ordinates of S′ using the resultant transformation matrix.

Q3)

i) Define the following terms:

a) Window;

b) View port;

c) Clipping.

ii) List out the types of Clipping.

iii) Briefly explain the Cohen-Sutherland line clipping algorithm.

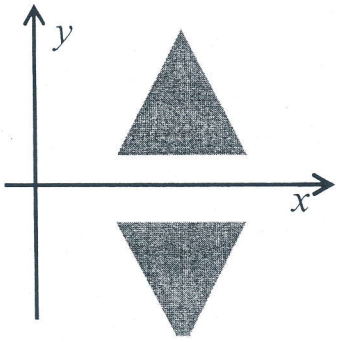
iv) Let W be a window whose bottom-left corner is (100, 100) and the top right corner is (300, 200) and AB be a straight line with A= (150, 150) and B= (400, 300). Apply the above algorithm to clip AB against window W.

Q4)

i) Give the equation for three Dimensional (**3D**) rotations about x axis by an angle β.

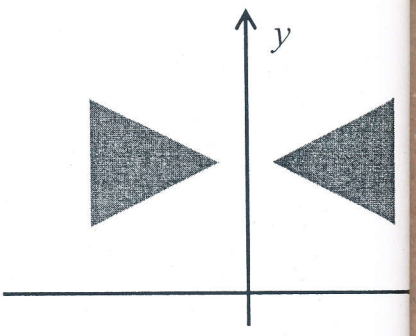
ii) Write down the Reflection ***matrices*** for the followings:

a)



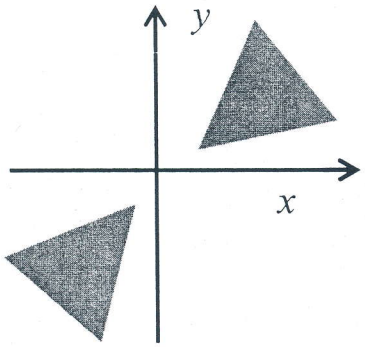
Reflection about x- axis.

b)



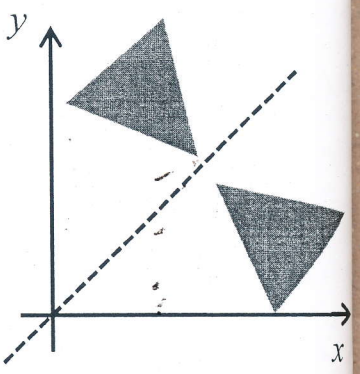
Reflection about y- axis.

c)



Reflection about an axis perpendicular to the xy plane.

d)



Reflection with respect to the line y=x.

iii) Reflect the diamond shape polygon whose vertices are A(-1,0), B(0,-2), C(1,0) D(0,2) about the horizontal line y = -4.