



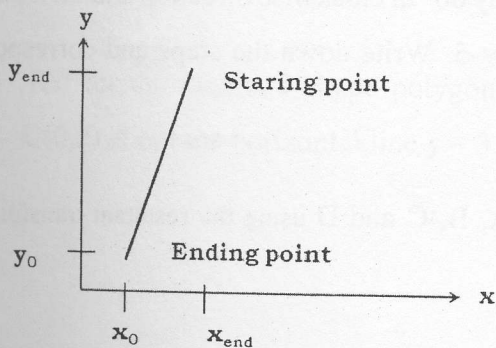
EASTERN UNIVERSITY, SRI LANKA
THIRD EXAMINATION IN SCIENCE -2011/2012
FIRST SEMESTER (Apr. /May, 2017)
EXTCS 301 – COMPUTER GRAPHICS
(Special Repeat)

Answer all Questions

Time: 2 Hours

1)

- i) Define in your own words what a Computer Graphics is.
- ii) Define the following terms:
 - a) World co-ordinates;
 - b) Device 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 $r = 3$ with center $(2, 2)$.
(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 following 3) D transformations in computer graphics:
- Rotation about origin;
 - Translation;
 - Scaling about pivot point;
 - Shearing in y-direction.
- ii) Consider the square shown below as Figure-A.

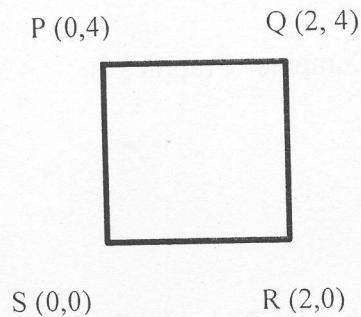


Figure-A

- a) Rotate the above object in *Figure-A* by 60° in clockwise direction and then translate the resultant object with $t_x=3$ and $t_y=-5$. Write down the steps and corresponding transformation matrices clearly.

Figure-B from *Figure -A*;

- b) Compute the new co-ordinates of A, B, C and D using the resultant transformation matrix.

23)

- i) Define the following terms:
 - a) Window;
 - b) View port.
- ii) Briefly explain the Cohen-Sutherland line clipping algorithm.
- iii) 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 $A = (50, 150)$ and $B = (120, 200)$. Apply the above algorithm to clip AB against window W .

4)

- i) Give the equation for three Dimensional (**3D**) rotations about y axis by an angle α .
- 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.
- iii) Reflect the diamond shape polygon whose vertices are $A(-1,0)$, $B(0,-2)$, $C(1,0)$ and $D(0,2)$ about the horizontal line $y = 3$.