North East University Bangladesh
Semester: Fall 2020
CSE 424 – Computer Graphics Lab
Lab Assignment
Marks: 40

Topic: Basic image, direct line, DDA, Bresenham line drawing algorithm, Mid-point circle, and Transformation of 2D

1. Elaborate the scan conversion algorithm of using following points: $P1(1.7, 0.8)$, $P2(2.2, 1.3)$ and $P3(2.8, 1.9)$.
2. If an image has a height of 2 inches and an aspect ratio of 1.5, what is its width? Find the CMY coordinates of a color as at $(0.2, 1, 0.5)$ in the RGB color space.
3. Solve the following problems applying corresponding algorithm as well as implement the reverse process for (II) and (III) –

Algorithm	Scan convert
(I) Direct straight line	a. $(0,\ 0)$ to $(6,\ 18)$ b. $(5,\ 7)$ to $(24,\ 34)$ c. $(1,\ 1)$ to $(8,\ 5)$
(II) DDA line drawing	a. $(2,\ 3)$ to $(6, 18)$ b. $(10,\ 20)$ to $(30,\ 40)$ c. $(3, 2)$ to $(15, 5)$ d. $(5, 4)$ to $(15, 9)$
(III) Bresenham line drawing	a. $(1, 1)$ to $(6, 7)$ b. $(35, 40)$ to $(43, 45)$ c. $(10, 20)$ to $(30, 18)$ d. $(14, 3)$ to $(8, 8)$

4. Solve following problems employing the Mid-point circle drawing algorithm and implement the reverse process as well –

   a) If 10 is the radius of the circle to be drawn $(4, 4)$ is its center then plot all octants for the circle.
   b) A point from the origin is $(25, 0)$ for a circle. Plot all octants to draw the circle.
   c) Plot all octants for the circle centered in origin, having the radius 14 units.
   d) Plot second, fourth, sixth, and eighth octants of the circle centered at origin, having the radius 8 units.
   e) If 20 is the radius of the circle to be drawn and origin is its center then plot the first, third, fifth, and seventh octants of the circle.

5. Transform $(5, 3)$, $(3, 4)$, and $(2, 1)$ points using translation and scaling factors 6 along x-axis and 9 along y-axis.
6. Transform with matrix $P_1(2, -3)$ and $P_2(-4, 10)$ points using translation and scaling factors 3 along x-axis and 4 along y-axis and rotate 90^o with clockwise.
7. Transform $(1, 2)$, $(4, 3)$ and $(3, 5)$ points using translation and scaling factors 9 along x-axis and 6 along y-axis and rotate 270^0 anticlockwise.
8. You are given two coordinates $P_1(3, -7)$ and $P_2(-4, 9)$. Rotate coordinates with 60^o angle. See the following figures for details.

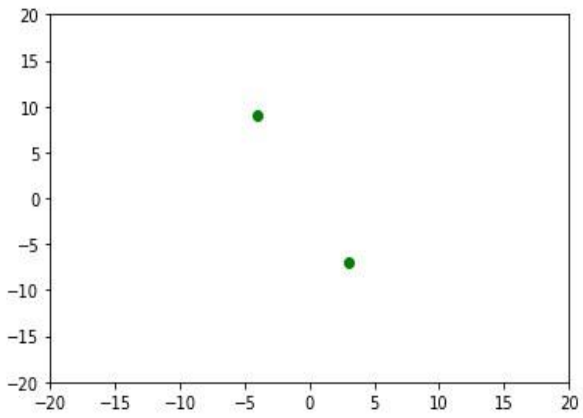


Figure 1 Before rotation

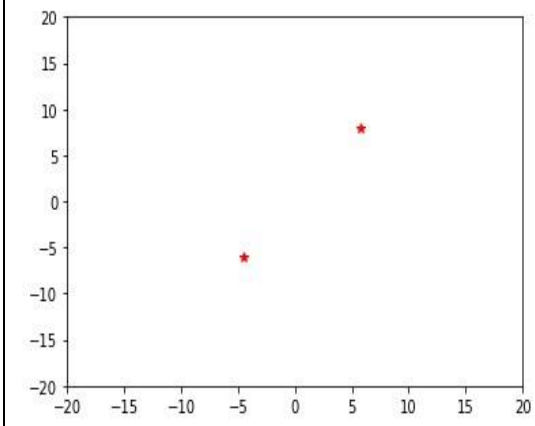
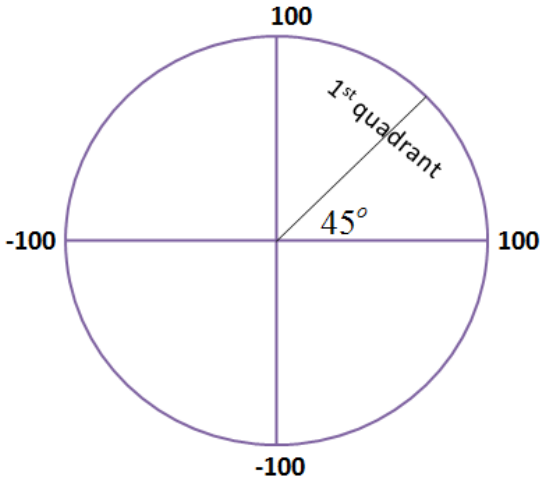


Figure 2 After rotation

9. You are given three coordinates $P_1(-64, 39), P_2(73, -89)$ and $P_3(-111, -99)$. Scale coordinates with the scaling factors $s_x = s_y = 2$ also plot the figure.
10. There is given a circle in a 2D graph. Find coordinates for all octants also show the effect of them on four quadrants.



11. Find all coordinates and show the change of them on four quadrants for a circle applying mid-point circle algorithm where the diameter $d = 500$.