**Assignment 1**

1. Consider three different raster system with resolution of 640 by 400, 1280 by 1024,and 2560 by   
2048. What size frame buffer (in byte) is needed for each of these systems to store 12 bits per pixel?   
How much storage is required for each system if 24 bits per pixel are to be stored?

2. Suppose an RGB raster system is to be designed using an 8-inch by 10-Inch screen with a resolution of 100 pixels per inch in each direction. If we want to store h bits per pixel in the frame buffer, how much storage (in bytes) do we need for the frame buffer?

3. How long would it take to load a 640 by 480 frame buffer with 12 bits per pixel, if 105 bits can be transferred per second? How long would it take to load a 24-bit per pixel frame buffer with a resolution of 1280 by 1024 using this same transfer rate?

4. Suppose we have a computer with 32 bits per word and a transfer rate of 1 mip ( million instructions per second). How long would it take to fill the frame buffer of a 300-dpi (dot per inch) laser printer with a page size *of* 12 Inches by 11 inches?

*5.* Consider two raster systems with resolutions of 640 by *480* and 1280 by 102 How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system?

6. Suppose we have a video monitor with a display area that measures 12 inches across and 9.6 inches high. If the resolution is 1280 by 1024 and the aspect ratio is I what is the diameter of each screen point?

7. How much time is spent scanning across each row of pixels during screen refresh of a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per second?

8. Assuming that a certain full-color (24-bit per pixel) RGB raster system has a 512-by-5l 2 frame buffer, how many distinct color choices (intensity levels) would we have available? How many different colors could be displayed at a time.

9. Consider a 1024 X 1024 scan lines image with 24 bit color. If 10 minute is required to capture, calculate the total time required?

**Assignment 2**

1. Digitize a line with end points A(11,9) and B(29,17) using Bresenham’s Line drawing algorithm.

2. Digitize a circle with radius 12 and center (3,4) using mid point circle algorithm.

3. A triangle with vertices A(5,2),B(4,1),C(6,1) is required to be rotated in a clockwise direction by   
45 degrees about any arbitrary point (4,4). Find out the final coordinate positions of the triangle after performing the desired transformation.

4. Reflect a Triangle A(1,0) B(3,1) C(1,2) about the line y = - **x +** 5

5. A triangle with vertices A(5,2),B(4,1),C(6,1) is required to be reflected about an arbitrary line y = 2x **+** 1. Find out the final coordinate positions of the triangle after performing the desired transformation.

6. A triangle with vertices A(5,2),B(4,1),C(6,1) is required to be rotated by 45 degrees in counter   
clockwise direction about i. origin and ii. line y = **5**

7. Clip a line with end point coordinates A(-1,6) B(5,-8) against a clip window with its lower left corner at (-2,-5) and upper right corner at (4,8) using Cohen Sutherland Algorithm.

8. Rotate triangle A(0,0), B(1,1), C(5,2) about origin and about point P(-1,-1) by 45 degrees in a counter clockwise direction.

9. Derive the composite transformation matrix that reflects an object about line ‘L’ with necessary figures.

10. Find scaling transformation matrix to scale units with respect to a fixed point P(x,y,z).

11. Use Cohen Sutherland’s algorithm to clip two lines (60,50) (100,10) against window (50,10) (80,40).

12. Show that 2D reflection thru x axis followed by 2D reflection thru line y = -x is equivalent to a pure rotation (90 degrees) about origin.

13. Prove that two successive rotation transforrnttions commute.

14. Triangle with vertices A(1,1), B(7,1),C(4,3) is required to be rotated about any arbitrary fixed point (4,2) in a counter clock wise direction by 90 degrees. What will be the final coordinates of the triangle?