Instructions: All answers must be typed other than small figures or matrices, which can be handwritten. Written assignment will be returned without grading if the work is not neat. Hard copies of written assignment must be submitted in class to Professor Majumder.

1. Rasterize the line (P1, P2) where P1 = (2,5), and P2 = (8,15). Find the coordinates and the color of each pixel rasterized by this line segment, given the color of P1 is 0.8 and that of P2 is 0.1. Also show that the center of the pixel that is rasterized by this line is at most at a distance 0.5 from the actual line. [15+10+5 = 30]

2. Draw the results of clipping of a triangle ABC defined by A=(500,100), B=(800,460) and C=(400,500) against a window whose x_min = 300, x_max=700, y_min=200 and y_max=500, using Sutherland Hodgeman’s method. Show the vertices remained in the window (including the ones newly created by clipping) for all the steps of the pipeline clearly. It does not matter if you do it clock-wisely or counter clock-wisely. [20]

3. You are rendering a black and white checkerered tiled floor using a single texture mapped polygon. The view is simulating a person standing on the floor and looking at a point far away from him on the floor. (1) Artifacts at the distant end of the floor can be seen. How would you remove these artifacts? (2) How can you explain why this method works using sampling theorem? [5+5=10]

4. One artifact of gouraud shading is that it can miss specular highlights in the interior of the triangles. How can explain it by analyzing the sampling algorithm of gouraud shading? [5]

5. You are given a display which has spatial resolution of 1000x1000 and a gray intensity resolution of 8. You would like to increase you intensity resolution to 50. How would you achieve this by giving up some of the spatial resolution? What is the minimum factor (i.e. no. of pixels for each unit) by which you have to trade off the spatial resolution to do so? [2+3=5]

6. Can quantization be explained as an artifact of insufficient sampling? Why or why not? We know that increasing the number of bits reduces quantization. Can that be explained in the context of insufficient sampling? Justify your answer. [3+2=5]