Computer Graphics

Comprehensive Examination, Fall 1999

Sign the exam with your student number - not your name

Select three (3) of the following questions to answer. Do not answer more than three.

1. \(33 \frac{1}{3}\) pts You are to Gouraud shading a triangle. Determine the color (red, green, blue) assigned to pixel (5, 5) given the following information.

   - The triangle has vertices (1, 3), (9, 3), (5, 7).
   - At these vertices, the triangle has color (0, 0, 0.5), (0, 0.5, 0), (0.5, 0, 0).
2. (33 $\frac{1}{3}$ pts) Explain why, where, and how homogeneous $(x, y, z, w)$ coordinates are used in computer graphics. Give several examples showing their usefulness.
3. (33 $\frac{1}{3}$ pts) Normal vectors and inner products are useful in computer graphics. Explain where and how edge and surface normals are used. Explain where and how inner products are used.
4. (33 \( \frac{1}{2} \) pts) Provide an overview of the graphics pipeline. What “spaces” occur in it? How does data map from one space to another? What types of algorithms are performed in each space?