

Computer Graphics Comprehensive Exam. Spring 2007

Choose three questions out of the following questions below. You should answer the three questions that you selected. Do not answer any other question. You should clearly indicate your choice of questions by circulating the question number. Your answers should be as detailed as possible with the required equations and illustrations (when appropriate). Good luck.

1. Show that any sequence of rotations and translations can be replaced by a single rotation about the origin followed by a translation.
2. Given two non-parallel, three-dimensional vectors u and v , how can we form an orthogonal coordinate system in which u is one of the basis vectors?
3. Describe a method for back-face polygon removal in details.
4. Describe the steps of the standard graphics pipeline and each transformation (matrices should be displayed in explicit form).
5. The Phong shading model consists of three main components: ambient component, specular component, and diffuse component. Write the equation of the Phong model and explain the details of each part of the equation. You should also illustrate the corresponding vectors in the components.