

DEPARTMENT OF COMPUTER SCIENCE  
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

**CS4204 COMPUTER GRAPHICS**  
**FALL SEMESTER 2007**  
**FINAL EXAM**  
**TAKE HOME QUESTIONS**

**1. Instructions:**

- Due time: 11:59pm Thursday, 12/13/2007.
- Please write a 1-2 pages document to address the questions described below.
- Please send the electronic version, in PDF or WORD format, of your document to your TA, Sean Ponce ([ponce@vt.edu](mailto:ponce@vt.edu)).
- The take home exam will be counted as 10% of your final exam score.

**2. Introduction:**

Ray Tracing is a global illumination based rendering method. It traces rays of light from the eye back through the image plane into the scene. Then the rays are tested against all objects in the scene to determine if they intersect any objects. If the ray misses all objects, then that pixel is shaded the background color. Ray tracing handles shadows, multiple specular reflections and refractions, and texture mapping in a very easy straight-forward manner.

In spite of its high quality rendering and simplicity, the ray tracing algorithm is very computationally expensive. In recently years, researchers have identified some acceleration methods that allow ray tracers to run in real-time applications. However, there are still many works need to be done in order to make the real-time ray-tracer to be widely used.

**3. Questions:**

- a) Please list some recent works that address the real-time issues of the ray tracing algorithm.
- b) Assume that your first job after you graduate is to design and implement a real-time ray-tracer in a video game engine. Even the manager doesn't expect you to know how to solve the problem, you will want to have a plan to seek the solution.

What strategies could you use to find out more about the problem and how to make progress on it?

What strategies would you use to evaluate your progress towards solution?