

Exam!!!

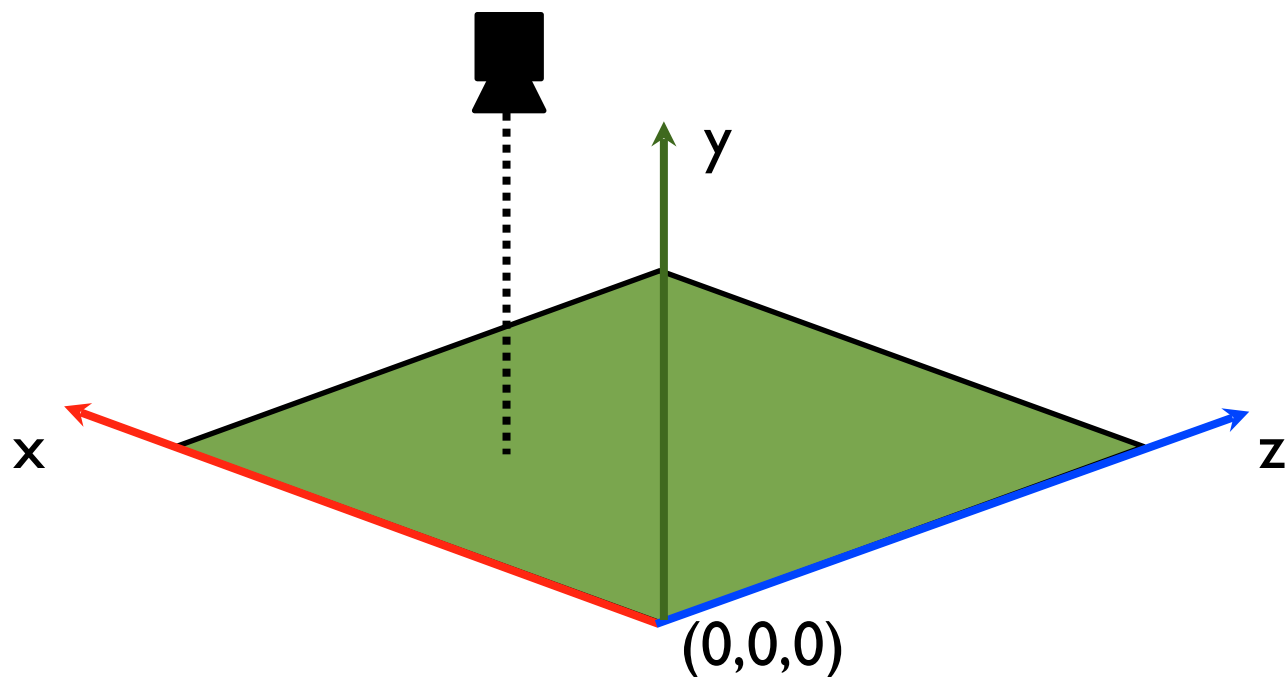
Exam

- 2 hours
- 14 questions
- 60% of your final mark
- Open book
- Calculators allowed
- Bring a ruler and pencils/eraser

Part A – Algorithms + code

Demonstrate use of an algorithm. Similar to many tutorial questions.

"In the scene shown, the camera is at $(2,3,1)$ in world coordinates, and is rotated to point straight down. Calculate the view matrix for this situation."



Solution

To move an object to `pos(2,3,1)` and then rotate by 90 to face the ground we would need to do

```
translated(2,3,1)
```

```
rotated(-90,1,0,0); //around x axis
```

But since this is the camera we need to do the inverse...so

Solution

rotated(90,1,0,0);

translated(-2,-3,-1);

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 0 & -1 & 1 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Part B- Definitions

Definitions and advantages/disadvantages of different approaches.

“What is a depth buffer? How is it used for hidden surface removal? What advantages or disadvantages does it have over the painter’s algorithm.”

Sample Solution

The depth buffer is a block of memory that holds the depth information for every pixel. For each fragment we draw, we calculate its pseudodepth and compare it to the value in the depth buffer. If it is closer to the camera, then we update the colour buffer and the depth buffer to the new fragment's colour and depth respectively.

The advantage of this over the painter's algorithm is that polygons can be drawn in any order. However, it requires more memory and does not support true transparency.

Part C- Applications

Questions that present a particular scenario and ask what methods you would use and why.

"For a 2D game you want to generate a variety of realistic images of apple trees in winter, like the one shown.

What kind of algorithm would you use to do this? What considerations affect your choice?"



Sample Solution

L-Systems are useful for producing realistic botanical models. I would use a stochastic L-System to incorporate randomness to provide a variety of trees.

Because it is a 2d game we would be able to render them fairly quickly. (If we were in 3d, we would have to be careful about run-time which can get high with complicated realistic 3d models)

Week 13

Demo locations have been posted on the course website. Try to be 10-15 minutes early. Bring laptop you want to demonstrate on, or you can use cse machine.

No consultation next week. Additional exam period consultation times will be scheduled. See the course website.

Week 13 Demo

You will be given a link to a level file at the start of the demonstration. You will need to load it into your assignment. This will allow the assessor to see most of the basic features and some extensions.

For the others and the other extensions, you will need to use your own level files. Please have them ready to go.

The assessor will also look at your code.

This is your chance to show off 😊

Q&A