The University Of New South Wales

Sample Exam - Written

SAMPLE

COMP3421 & COMP9415

Computer Graphics

Time allowed: 1 hours
Total number of questions: 14
Total number of marks: 28
Number of pages: 4

Note: Actual exam will be 2 hours and worth 60 marks
Examination Materials: Rulers, Textbooks, print-outs and hand written
notes permitted.
UNSW Approved Calculators may be used.
Questions are NOT worth equal marks.
Answer all questions.
This paper may not be retained by the candidate.

There are 3 parts. Part A, B and C. Answer each part in a separate booklet.
Answers must be written in ink. Except where they are expressly required, pencils may be used only for drawing, sketching or graphical work.
Part A:

Question 1

(5 marks)

The normal at a vertex (0, 0, 2) on a surface is (0, 1, 4). The light source is at (0, 1, 4). The intensity of the light is (0, 0, 2). The diffuse co-efficient of the surface is (0, 0, 1). What will the RGB colour of the vertex be? Assume there is no specular, ambient or any other light reflected by the surface.

Question 2

(6 marks) Suppose you want a camera positioned at point (3, 2, 1) in world co-ordinates looking towards point (1, 0, -1) such that the x-axis of the camera’s coordinate frame is parallel to the x-z plane. Assume no scaling has been applied to it.

(a) What would the camera’s local coordinate frame be (expressed as a matrix)? (3 marks)

(b) What would the view matrix be for this camera? (2 marks)

(c) Give the camera co-ordinates of a vertex with world co-ordinates of (-1, 1, 3). (1 mark)
Part B: Short answer questions

Provide short 3-4 sentence answers to the following.

Question 3

(3 marks) What are BSP trees? Give one application for which they can be used? What problem do they solve in that application?

Question 4

(3 marks) What is the difference between a fragment shader and vertex shader? How do they relate?

Question 5

(3 marks) What is trilinear filtering?
Part C: Design problems

Provide one paragraph answers to the following.

Question 6

(4 marks) You are applying for a job as a computer graphics expert. In the technical interview they ask you what kind of modelling techniques you would use to model the shape and surface of a shiny metal teapot for a real-time game. Give reasons for your choices.

Question 7

(4 marks) You want to render a scene with soft shadows and realistic diffuse lighting. What technique(s) would give the most realistic outcome? What are the pros and cons of this/these techniques?

— End of exam —