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Student Number: _		
Signature		

The University Of New South Wales
Sample Exam - Written
SAMPLE

Name

COMP3421 & COMP9415

Computer Graphics

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

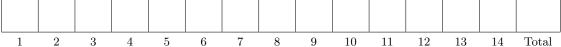
Note: Actual exam will be 2 hours and worth 60 marks Examination Materials: Rulers, Textbooks, print-outs and hand written notes **permitted**.

> 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.

Examiner's Use Only:



Part A:

Question 1

(5 marks)

The normal at a vertex (0,1,2) on a surface is (0,4,5). The light source is at (0,1,4). The intensity of the light is (0.9,0,0.2). The diffuse co-efficient of the surface is (0.4,1,0). 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 — $\,$