UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, 2007

Title of Paper	:	Computer Graphics
Course Number	:	CS246
Time Allowed	:	Three (3) Hours
Instructions	:	Answer **ALL** questions from Section A Answer **only THREE** questions from Section B Each question is worth **20 marks**
Special requirement	:	Graph paper

This paper should not be opened until permission has been granted by the invigilator.

SECTION A

QUESTION 1

(a) Describe the properties of a good user interface. **[6]**

(b) As a computer science student, how would you define an API? **[3]**

(c) What is meant by the term aspect ratio? **[3]**

(d) Why are vector graphics images limited in complexity? **[8]**

QUESTION 2

(a) Compare and contrast raster graphics and vector graphics (paying special attention on the strengths and weaknesses of each one). **[10]**

(b) Describe orthographic and perspective projections with good supporting diagrams. **[10]**

SECTION B

QUESTION 3

(a) Vector graphics, though later disused, was a great improvement from the era of working with hard copy outputs only – in what way(s) was vector displays superior to printers? **[4]**

(b) Sizes of CRTs are normally given by the length of their diagonal (the ratio of the width and height is standardised at 2:3). With a 14" tube a *640* x *480* frame buffer, what are the horizontal and vertical resolutions? What area of the screen should be used to get an aspect ratio of 1:1? **[10]**

(c) How much memory is needed for a *1024* x *1024* frame buffer with depth 5? **[6]**

QUESTION 4

(a) Lines are an important aspect of computer graphics – hence their quality. List three criteria for judging a good line drawing algorithm. **[3]**

(b) Draw the diagram resulting from the following five segments and compute the coordinates (don't read them from the diagram) of their points of intersections, if any: **[12]**

(i) the line $x = y$ clipped to the rectangle defined by *(0,0)* and *(12, 15)*

(ii) segment joining the points *(0,4)* and *(6,10)*

(iii) segment defined by:

$$\begin{pmatrix} x \\ y \end{pmatrix} = \lambda \begin{pmatrix} 1 \\ 7 \end{pmatrix} + \begin{pmatrix} 4 \\ 1 \end{pmatrix}; 0 \leq \lambda \leq 1$$

(iv) segment joining the points *(8,13)* and *(14,6)*

(v) the line $x = 17$ clipped between the lines $y = 3$ and $y = 13$.

(c) Establish and briefly describe all the possible segment-segment relations. **[5]**

QUESTION 5

Discuss the differences and similarities of virtual reality and augmented virtual reality. Give an example of a possible application for each. **[20]**

QUESTION 6

(a) Discuss the importance of studying computer graphics alongside image processing and user interfaces. **[8]**

(b) Give an example of a situation where a fixed microphone would be the best form of input device. Justify your answer. **[4]**

(c) Discuss four user interface design principles **[8]**