UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, 2012

Title of Paper	:	Computer Graphics
Course Number	:	CS246
Time Allowed	:	Three Hours
Instructions	:	Answer **ALL** questions from Section A Answer **only THREE** questions from Section B All questions are 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) How would you distinguish computer graphics form its closely related counterpart, namely image processing. Give two applications from each discipline. **[6]**

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

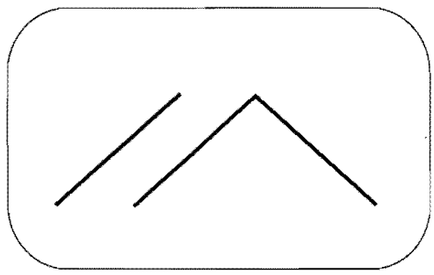
(c) Why is it that the statement "this software is user friendly" is senseless? **[3]**

(d) The production of a good user interface is associated with both human and technical problems. Briefly describe two of each. **[8]**

QUESTION 2

(a) Compare and contrast raster graphics and vector graphics (paying special attention to how each one flourished or was a failure during its era). **[10]**

(b) Draw the input control signals which would produce the following output on a vector graphics display. **[10]**



The first two lines are parallel; the third intersects the second at a right angle.

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 calculate their points of intersections: **[12]**

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

Describe three different interface dialogues with their suitable application areas stating all the advantages that each of them has over the other two in the application area that you have chosen. **[20]**

QUESTION 6

(a) Group, describe and differentiate the following devices: scanner, loudspeaker, data-glove, plotter, and frame-grabber. **[8]**

(b) Give an example of a situation where a loudspeaker would be the best form of output stating why you think the loudspeaker would be the best form of output in that situation. **[4]**

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