

UNIVERSITY OF SWAZILAND

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE

SUPPLEMENTARY EXAMINATION, JULY 2008

Title of Paper	:	Computer Graphics
Course Number	:	CS 246
Time Allowed	:	Three Hours
Instructions	:	Answer ALL questions of 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

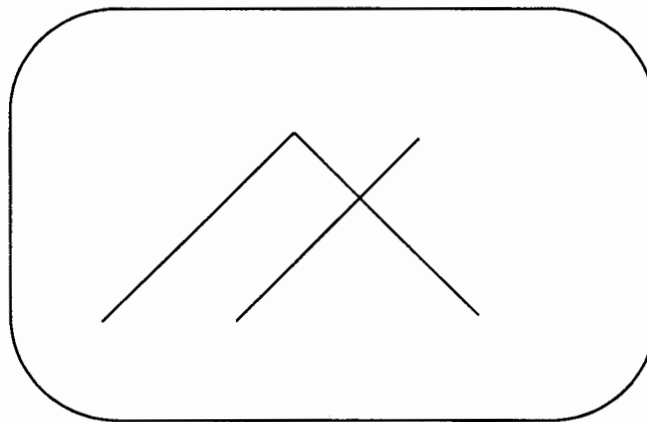
Section A

Question 1.

- a) Define an API? [3]
- b) Why is it so difficult yet so important to produce a good user interface? [8]
- c) Why should we study API alongside computer graphics? [3]
- d) Distinguish computer graphics from its closely related counterpart, namely image processing. Give two applications from each discipline. [6]

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). [6]
- b) Briefly describe how a CRT works in conjunction with a vector display. [4]
- c) 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 first two at a right angles.

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 standardized at 2:3). With a 14" tube and 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 1024x1024 frame buffer with depth 5? [6]

Question 4.

- a) Compute the coordinates of the image of (3,2) after each of the following transformations:
 - rotation around the point (4,1) through an angle of 90°;
 - rotation around the point (3,2) through an angle of 90°. [4]
- b) Find the transformation matrix for rotation around the point (x,y) over an angle θ . [6]
- c) Draw the diagram resulting from joining the following points: (5,7), (5,4), (2,1) and (2,3) and draw the image that will result after performing the following transformations in succession:
 - scaling by scale factor 2;
 - clipping using the clipping window (0,0) – (10,10);
 - rotation through 90°, around the origin. [10]

Question 5.

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

Question 6

- a) Describe the differences and similarities between a scanner and a frame-grabber. [8]
- b) Describe two examples of situations 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, say over a printer. [4]
- c) Discuss four user interface design principles [8]

University of Swaziland

**Faculty of Science
Department of Computer Science**

Supplementary Examination, July 2008

Title of Paper: Computer Organisation II

Course Number: CS341

Time Allowed: Three (3) hours

Instruction: Answer five questions. Questions carry equal marks.

You are reminded that in assessing your work, account will be taken of the accuracy of the material, of the language used and the general quality of expression, together with the layout and presentation of your answer. Remember full answers will usually *define, explain and exemplify*. The use of a calculator is prohibited.

Special Requirement:

Calculators are prohibited.

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Question 1. [20]

Using an editor of your choice, show how to do the following:

- a) enter the editor to edit a script file *341.txt* of ten lines.
- b) insert a line after line four: *#This is line 4a.*
- c) correct the first line which is *sbin/bash*
- d) insert at the end, the line: *# end of script.*
- e) exit

Question 2. [20]

How does the direct mapped cache work? Why are caches used?

Question 3. [20]

- a) Differentiate between temporal and spatial locality
- b) What is a bundle in the IA64
- c) Explain re-entrancy and non-re-entrancy
- d) What range of numbers can be represented in 1's complement in 4 bits?
- e) How many instructions can be created using four 4-bit fields using the expanding opcode scheme?

Question 4. [20]

Outline the operation of a two pass assembler.

Question 5. [20]

What do these Unix commands do? Give an example of their usage.

- s) su
- b) history
- c) grep
- d) find
- e) |

Question 6. [20]

a) Convert to reverse Polish:

$(a + b) * c$

$b + b + b$

b) Convert to infix:

$p q * r s + -$

c) What are the strengths of each of these two notations?

End of examination paper.