



***"Investing in Africa's Future"***

**COLLEGE OF BUSINESS PEACE, LEADERSHIP AND GOVERNANCE**

**CSC 300 COMPUTER GRAHICS**

**END OF FIRST SEMESTER EXAMINATIONS**

**MAY 2020**

**LECTURER: MR A.C MUZENDA**

**DURATION:**

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### ***INSTRUCTIONS***

Answer all Questions in Section A and any ONE question from Section B  
Total possible mark is 100

Start **each** question on a new page in your answer Booklet.

The marks allocated to **each** question are shown at the end of the section.

## SECTION A [60 marks]

**Answer all questions in this Section**

### QUESTION ONE

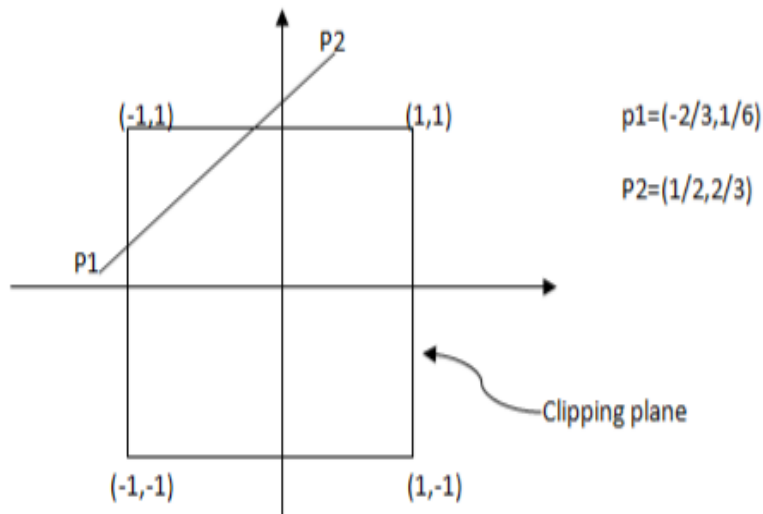
- i. Alpico is an organization which mainly deals with entertainment related industry activities. They had decided to integrate computer graphics design to promote places or events as well. These could be posters, flyers, billboards or online graphics. The organization wants to set up a graphic system and has approached you as an expert in computer graphic design. Advise them on the best hardware and software (giving examples) components they will require to set up a 3D graphic system, also highlight on the factors they need to consider when acquiring the components. [15]
- ii. In computer graphics, a computer graphics pipeline, rendering pipeline or simply graphics pipeline, is a conceptual model that describes what steps a graphics system needs to perform to render a 3D scene to a 2D screen. With the aid of visuals, briefly explain the 3D pipeline and how the 3D viewing is implemented? Explain the importance of the four steps in the 3D viewing pipeline. [30]
- iii. A rectangle ABCD with coordinates, A(0;0), B(0;4), C(4;4) and D(4;0) has been transformed. Find the resultant matrix;
- i. Rotating the rectangle by  $60^\circ$  and translating by (2;0) [10]
- ii. Draw the resultant diagram for the problem above. [5]

## SECTION B [40 MARKS]

**Answer any one questions**

### QUESTION TWO

- a. Provide the details of clipping the following lines using the Cohen-Sutherland line clipping algorithm. Derive the out codes for each end-point, and determine the segments that will be trivially rejected/accepted. In case where a trivial rejection/acceptance is not possible, indicate where the line be clipped and explain how the resulting clipped segments will be processed. [14]



- b. Aliasing is a serious problem in that it produces unpleasant or even misleading visual artifacts. Discuss situations in which these artifacts matter, and those in which they do not as well as ways to minimize the effects of jaggies, and explain what the “costs” of those remedies might be. [14]
- c. Draw the circle with  $radius = 12$  using the Bresenham algorithm and centre at  $(0,0)$ . [12]

### QUESTION THREE

- a. Briefly describe how Liang-Barsky line clipping algorithm is different from CohenSutherland line clipping. [4]
- b. State the main difference between Phong interpolative shading and Gouraud interpolative shading and then describe why Phong interpolative shading is more expensive than Gouraud interpolative shading. In your answer, describe all

- the extra operations that must be done in Phong interpolative shading that are not done in Gouraud interpolative shading. [30]
- c. Distinguish between convex and concave polygons. [6]

#### **QUESTION FOUR**

- a. The surface design for a new computer case features a repeated pattern of bumps. The simulation of the new design is to be presented as a series of computer graphics renderings, showing the case from different angles and also in close-up views. Contrast the advantages and disadvantages of using bump mapping and displacement mapping as part of the rendering process for this scenario. [30]
- b. Describe in detail the shadow-mask method for CRT displays highlighting how different colors can be formed. [10]

*THE END*