Brac University
Department of Computer Science and Engineering

CSE 423: Computer Graphics

Theory Assignment 02 | Full Marks: 30 | Semester: Spring 2025

Answer **all** the following questions.

1.	a) Given a line segment from **(-10, 5) to (20, 50)**. Construct the parametric equation **P(t)** of the line. Using the parametric equation determine the coordinate of the point where **t=3/4**. Show whether the point with a **t =7** lies inside the line segment. **[2]** b) Draw a shape of a clip region where the Cyrus Beck Algorithm will not work. **[2]** c) A viewing window from **(-10, 10) to (50, 150)** is given. Using the **Cyrus-Beck algorithm**, check whether the line segment **(30, 40) to (100, 90)** is fully accepted/rejected/needs to be clipped. **[6]**
2.	a) A clip region from (-50, -10) to (10, 10) is given. Check whether the line segment **(-20, -30) to (5, 20)** is accepted/rejected/partially inside using the **Cohen-Sutherland Algorithm. [6]** b) In which scenarios does the **Cohen-Sutherland Algorithm** work the best? Explain. **[4]**
3.	**Kentaro Miura** has drawn the nose of Guts as a triangle. He initially started with **3 vertices** of the triangle, first **rotated them 30° clockwise about a point (5, 5)**, followed by a **scaling of 6** in both axes. Next, he **translated** the vertices **by (20, 10)** and lastly, **sheared** off the vertices **by (8, 7) about a point (2, 2)**. The final 3 vertices after all the transformations are **(12, 15)**, **(8, 10),** and **(11, 17)**. Due to the sudden passing of Kentaro Miura, **Koji Mori** now has to take over. He first needs to calculate the **initial 3 vertices**. **Using homogenous coordinates**, find the initial 3 vertices. ***You have to show the full composition of all the matrices and all the steps. **[8]** Which geometric properties were preserved at the end after Guts' nose transformations? **[2]**