National University of Sciences & Technology

School of Electrical Engineering and Computer Science

Department of Computing

CS361 - Computer Graphics

Assignment # 2: Clipping	
CLO 4 - Design and implement 2D and 3D graphical solutions for real-world problems.	
Maximum Marks: 10	Instructor: Dr. Sidra Sultana
Date:11-03-2025	Deadline: 21-03-2025

Scenario 1: Line Clipping in a Game

A game developer is designing a **2D adventure game** where the player moves inside a **rectangular game world**. The game window represents the **viewable area**, and any objects outside this window should not be rendered to optimize performance.

Q1. Which line clipping algorithm (Cohen-Sutherland or Liang-Barsky) would you recommend for efficiently clipping off-screen objects? Justify your answer.

Q2. Suppose a laser beam is fired from (2, 2) to (12, 8) in a game world where the clipping window is from (0,0) to (10,10). Use the Cohen-Sutherland algorithm to determine the visible portion of the line. Show your calculations step by step.

Scenario 2: Satellite Image Processing

A satellite imaging system captures large geographical areas, but only a specific region of interest (ROI) needs to be analyzed.

Q1. A satellite image covers coordinates from (-500, -500) to (500, 500). A scientist wants to analyze only the portion between (-100, -100) and (300, 300). Describe how you would apply polygon clipping to extract the required region.

Q2. The satellite software must handle curved boundaries like coastlines. Which algorithm should be used if the clipping region is not a perfect rectangle but an irregular shape like a country's border? Explain your reasoning.

Scenario 3: Real-Time Video Conferencing

A **video conferencing application** allows users to share their screens, but only the portion inside a **resizable sharing window** should be transmitted.

Q1. Suppose a user resizes the sharing window dynamically. What clipping technique should be used to ensure only the visible portion of the shared screen is transmitted? Explain your choice.

Q2. If the shared window is irregular (not a rectangle), what polygon clipping algorithm should be used to handle the shape correctly? Justify your answer with an example.