CS 302/352: Computer Graphics and Visualization

Assignment #4

1. Use the Cyrus-Beck line clipping algorithm to clip the line segment P_1 (2,3) to P_2 (12,8) against a convex polygon with the following vertices given in counter clockwise order:
   V_1(1,1), V_2(6,1), V_3(8,4), V_4(5,7), V_5(2,5)

   Determine the parametric values at which the line enters and exits the clipping region and find the coordinates of the clipped line segment.

2. Use the Midpoint Ellipse algorithm to plot an ellipse with a major axis length of 10 units and a minor axis length of 6 units, centered at (0,0). Perform the step-by-step calculations for the first quadrant and determine the initial decision parameters for Region 1 and Region 2.

3. Implement the Midpoint Circle Algorithm to draw a circle. The function should take the circle's center (x_c,y_c) and radius r as input. Compute and print the circle points. Plot the circle using Matplotlib.

4. Implement the Cohen-Sutherland Line Clipping Algorithm. Your task is to:

   - Define a clipping window with given xmin, ymin, xmax, ymax.
   - Take two endpoints (x1,y1) and (x2,y2) as input.
   - Determine whether the line should be fully accepted, rejected, or clipped based on the Cohen-Sutherland algorithm.
   - If the line is partially outside, compute the clipped version and display both the original and clipped line.

   Example Input:
   cohen_sutherland_clip(5, 5, 60, 70)
   Expected Output:
   A plot showing the original line (dashed), the clipped line (solid), and the clipping window (blue box).

Instructions

- Include comments in your code explaining each step.
- Provide hand written answers wherever required.
- Submit your answers in a pdf file with format: assignment4_<roll. no.>.pdf.