

# BRAC UNIVERSITY

## Department of Computer Science and Engineering

Examination: Online Midterm Exam  
Duration: 1 Hour 15 Minutes

Semester: Fall 2023  
Full Marks: 30

### CSE 423: Computer Graphics

Answer the following questions.  
Figures in the right margin indicate marks.

1. CO1
- In between DDA(Digital Differential Analyzer) and MPL(Midpoint Line Algorithm), **which one** would you choose as an ideal Algorithm to draw a line? Please **state** your reasons with sufficient explanation. **2**
  - Suppose the line  $y = -2.5x + 10$ , intersects the y-axis at A and the x-axis at B. **Identify** the zone of the straight line AB and **derive** essential derivatives for plotting the lines using the mid-point line drawing algorithm, **convert** the endpoints of the line AB to zone-0. **3**
  - Using the Midpoint Line Algorithm and 8-way Symmetry, **compute** the first 6 pixels of the line that goes from A to B. You must show the values of d and the direction in which the pixels are being selected at each stage, along with the values of the pixels (in zone 0 & the actual zone in which the line belongs) **5**
2. CO2
- Suppose, the starting point of a circle is (0, p). While drawing the circle in Zone-1 (Clockwise) using the Midpoint Circle drawing algorithm, the East pixel has been chosen 10 times and the South-East pixel has been chosen 6 times. **What** will be the endpoint? **2**
  - In the Midpoint Circle Drawing Algorithm, the value of  $d_{init}$  is  $1.25-r$ . Do you think it causes any issues? If Yes, clearly **show** how you resolve it. If not, then **explain** why. **3**
  - Calculate** all the circle pixels of Zone-5 of a Circle where,  $r = 9$ , and the origin/center of the circle is at (-4, 13) showing the present value of d as well as  $\Delta s$  at each stage. **5**  
[Hints: Starting from (0, -r) and clockwise]
3. CO3
- Fill in the blanks for the following outcode-finding function for the Cohen-Sutherland algorithm: **2**

```
def Calculate_outcode(x,y):
    bit0 = bit1 = bit2 = bit3 = 0
    if ____:
        bit0 = 1
    if ____:
        bit1 = 1
    if ____:
        bit2 = 1
    if ____:
        bit3 = 1
```

Bit sequences are given below:

3	2	1	0
Above	Below	Right	Left

The screen is from (x\_min, y\_min) to (x\_max, y\_max)

- b. At most **how many** clippings of a line are done while clipping a 3D line using the Cohen-Sutherland line clipping algorithm? Mention the name of the intersection points. [Hints: Intersection with Top, ...] **3**
- c. Suppose, you are given a window size  $(-100, -80)$  to  $(100, 80)$  and a straight line from  $(-160, 90)$  to  $(150, -88)$ . Using the Cyrus-Beck algorithm, **compute** the portion of this straight line within the clipped window. [You have to show  $t_{\max}^E$  and  $t_{\min}^L$ ] **5**

## Submission Form Links:

[https://docs.google.com/spreadsheets/d/1X8ewbrE0PNh9AQxG2G8qID1jC7s2Ldy\\_TQ4I2bMFQ4c/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1X8ewbrE0PNh9AQxG2G8qID1jC7s2Ldy_TQ4I2bMFQ4c/edit?usp=sharing)