

MZU

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# BRAC UNIVERSITY

## Department of Computer Science and Engineering

Examination: Midterm Exam  
Duration: 1 hour 15 minutes

Semester: Spring 2023  
Full Marks: 30

### CSE 423: Computer Graphics

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

1.  $f(x, y) = \frac{x}{2} + \frac{y}{3} - 4 = 0$   
Suppose, you have to plot the above line starting from its intersection with the x-axis and ending at that of the y-axis.
  - a. **Identify** the Zone (from Zone-0 to Zone-7) of the above line. 2
  - CO1
  - b. **Derive** starting/initial deviation ('d') and its derivatives ( $\Delta s$ )/decision parameters using mid-point line drawing algorithm. 4
  - CO1
  - c. Using the mid-point line drawing algorithm, **compute** all the pixels (from start to end) to be colored for the given line segment. **Show** the present value of d as well as  $\Delta s$  at each stage. 4
  - CO1
2.
  - a. **Derive** starting/initial deviation ('d') and its derivatives ( $\Delta s$ )/decision parameters for drawing one octant of a circle starting from (0, r) using mid-point circle drawing algorithm. 5
  - CO1
  - b. **Calculate** all the pixels of one octant of a Circle starting from (0, r) where, r = 10, and origin/center of the circle is at (-3, 5), showing the present value of d as well as  $\Delta s$  at each stage. 5
  - CO1
3.
  - a. **Write** an algorithm for making **region-outcode** of a 3D end-point using Cohen-Sutherland line clipping algorithm (assuming lowest bits for x and highest bits for z) 4
  - CO2
  - b. Suppose, a viewing window from (-200, -150) to (200, 150) is given. 6
  - CO3
  - (i) **Compute** the numerical value of 't' for all boundaries for a given line segment starting from (-220, 300) to (300, 100).
  - (ii) **Classify** them as 't<sub>E</sub>' or 't<sub>L</sub>'.
  - (iii) **Determine** the new endpoints using the value of 't<sub>E<sub>max</sub></sub>' and 't<sub>L<sub>min</sub></sub>'