

1B - Computer Graphics and Image Processing

Supervision 2

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1 Matrices

Give as many reasons as possible why we use matrices to represent transformations. Explain why we use homogeneous co-ordinates

2 Bezier cubics

Derive the conditions necessary for two Bezier curves to join with

- Just C0-continuity
- C1-continuity
- C2-continuity.

What would be difficult about getting three Bezier curves to join in sequence with C2-continuity at the two joins?

3 Curves

Implement the Midpoint circle drawing algorithm for integer radius and integer center location. Hints:

- Implement the algorithm for one octant, centered on the origin, then draw the other octants by manipulating the co-ordinates of the drawn point: (x,y) , $(-x,y)$, (y,x) , $(y,-x)$, etc.
- Implement the algorithm for a circle centered on the origin and then simply offset the pixel that is drawn by the coordinates of the actual center.

Write the Bzier adaptive algorithm, using your Midpoint line drawing to draw the lines. To test this on a pixel grid of size $H \times W$, try the Bzier curve specified by the four points: $(1,1)$, $(2H,1)$, $(-H,W-1)$, $(H-1,W-1)$. Draw the same Bzier curve at five different tolerances: 33, 10, 3.3, 1, 0.33 pixels. Draw something interesting!