

COMPUTER SCIENCE TRIPOS Part IB – 2012 – Paper 4

3 Computer Graphics and Image Processing (PR)

- (a) What are the main criteria to be considered in the design of a line drawing algorithm for a raster graphics display? [2 marks]
- (b) Describe an algorithm to fill a series of pixels running from (x_0, y_0) to (x_1, y_1) that meets these criteria, explaining why it does so. Answers should consist of more than a fragment of pseudo-code. [6 marks]
- (c) A new volumetric display stores an image as a three-dimensional array of volume elements or *voxels*. Reformulate the design and implementation of the line-drawing algorithm to fill a series of voxels running from (x_0, y_0, z_0) to (x_1, y_1, z_1) . [6 marks]
- (d) How would this line-drawing algorithm be used to draw Bézier curves in three dimensions? [6 marks]