

THE BCS PROFESSIONAL EXAMINATION

The Professional Graduate Diploma

April 2000

EXAMINERS' REPORT

Computer Graphics

This examination had a low number of candidates entering for it this year, so no general conclusions can be drawn. However, a common error was to omit the diagram(s) asked for in the question. This report on the examination will concentrate on indicating the answers expected by the examiners.

Question One – Answer Pointers

The omission of suitable diagrams was the main reason for losing marks here. The first two parts were, in general, answered well, candidates understanding how the intensity of the diagonal line would be less and suggesting the modification of the intensity according to the gradient. The third part on scan converting circles tended to elicit rather vague answers, suggesting an overall lack of understanding of the subject. A plotted point (x,y) can be reflected to form a total of eight plotable points, except when $x=y$ or $x=0$ or $y=0$. The solution to this problem is bookwork. Similarly, little understanding was demonstrated in the last part of the question where the vertical spacing of pixels increases as x increases - giving a visually unsatisfactory result.

Question Two – Answer Pointers

Missing diagrams lost marks again. The transformation matrices were not always provided and when they were they were not multiplied together to provide the required result. The matrices required by the question are all standard textbook material. The second part of the question tested the candidates' ability to apply these matrices in situations where the transformation is not about or through the origin. Finally, the question required an understanding of window and viewport transformations - applying a translation to the origin, scaling and translation to achieve the desired placement result. Again, a composite matrix should have been calculated.

Question Three – Answer Pointers

The answers to this question were extremely sketchy. Diagrams, when provided, were missing control points even though these were explicitly asked for in the question. The question tested candidates' knowledge of curve construction using Bézier, B and Hermite splines. Most of the material required for an answer to this question was straightforward - only in the last part were candidates stretched, requiring an understanding of how the tangent vector could be manipulated to generate families of curves and indeed making use of common endpoints and common tangent vectors (with opposite signs) for first-order continuous curves.

Question Four – Answer Pointers

This question was designed to test the candidates' knowledge and understanding of the various colour models and the circumstances in which they would be used. The first part investigated the candidates' ability to convert between the RGB and YUV models - the examiners realising that the answer to (a)(ii) is not bookwork and that a variety of possible answers is acceptable. The second part tried to discover what the candidates knew about more intuitive models such as HSV/HSB. The third part addressed models that might be used by a colour printer and conversion to them from RGB.

Question Five – Answer Pointers

This question was designed to test the candidates' general knowledge and understanding of ray tracing and radiosity techniques. The first part asked the candidates to describe ray tracing through 4 sub-questions that led them through the key elements in the process - firing rays from the centre of each pixel into the model and determining the colour of the closest object it intersects. Secondary rays are used to take account of reflection, refraction and shadow. The second part applied the same approach to radiosity to test the candidates' knowledge and understanding of this different approach.

