

## 2001 Paper 8 Question 4

### Advanced Graphics and HCI

- (a) For a given order,  $k$ , there is only one basis function for uniform B-splines. Every control point uses a shifted version of that one basis function. How many different basis functions are there for open-uniform B-splines of order  $k$  with  $n + 1$  control points, where  $n \geq 2k - 3$ ? [6 marks]
- (b) Explain what is different in the cases where  $n < 2k - 3$  compared with the cases where  $n \geq 2k - 3$ . [3 marks]
- (c) Sketch the different basis functions for  $k = 2$  and  $k = 3$  (when  $n \geq 2k - 3$ ). [4 marks]
- (d) Show that the open-uniform B-spline with  $k = 3$  and knot vector  $[000111]$  is equivalent to the quadratic Bezier curve. [7 marks]