1997 Paper 13 Question 4

Computer Graphics and Image Processing

It is convenient to be able to specify colours in terms of a three-dimensional coordinate system. Three such coordinate systems are: RGB, HLS, L*a*b*.

Choose *two* of these three coordinate systems and for *each* of your chosen two:

(a) describe what each of the three coordinates represents [2 marks each]

(b) describe why the coordinate system is a useful representation of colour [2 marks each]

Draw *either* the first eight one-dimensional Haar basis functions *or* the first eight one-dimensional Walsh–Hadamard basis functions. [4 marks]

Calculate the coefficients of your chosen eight basis functions for the following one-dimensional image data:

12 16 20 24 24 16 8 8 [4 marks]

Explain why, in general, the Haar or Walsh–Hadamard encoded version of an image is preferable to the original image for storage or transmission. [4 marks]