

7 Floating-Point Computation (DJG)

- (a) Briefly describe the steps used in floating-point multiplication. [3 marks]
- (b) What exceptions are possible during floating-point multiplication and at what stage in the process of part (a) should they be checked? [3 marks]
- (c) Give code or pseudocode that divides a binary-coded floating-point variable by the constant number ten (1010 in binary). [Note: Full marks awarded for code or pseudocode optimised for this constant divisor.] [7 marks]
- (d) Explain the principle of the following iteration:

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

[2 marks]

- (e) A programmer writes the following iteration for the square-root of A .

$$x_{n+1} = \frac{\frac{A}{x_n} + x_n}{2}$$

Show that this is a Newton–Raphson iteration (or otherwise explain its basis) and say approximately how many steps it should take to converge for single and double-precision floating point. [5 marks]