REVIEW - CHAPTER 1

1.12. What three properties characterize a well-posed problem?

1.13 List three sources of error in scientific computation.

Explain the distinction between:

1.14. (a) truncation (or discretization) and rounding,

1.15. (b) absolute error and relative error,

1.16. (c) computational error and propagated data error,

1.17. (d) precision and accuracy,

1.22. (e) forward and backward error,

1.24. (f) how are forward and backward error related to each other?

REVIEW - CHAPTER 1

1.18. (a) What is meant by the *conditioning* of a problem?

Is it affected by:

(b) the algorithm used to solve the problem?

(c) the precision of the arithmetic used to solve the problem?

1.36. (a) Give an example to show that floating-point addition is not necessarily associative.

(b) Give an example to show that floating-point multiplication is not necessarily associative.

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1.37.(a) In what circumstances does cancellation occur in a floating-point system?

(b) Does it imply that the true result of the specific operation causing it is not exactly representable in the floating- point system?

(c) Why is cancellation usually bad?

1.49.Explain why an alternating infinite series, such as: $e^x = 1 + x + x^2/2! + x^3/3! + \ldots$ for $x < 0$, is difficult to evaluate accurately in floating-point arithmetic.

REVIEW - CHAPTER 1

1.44. (a) Explain the difference between the unit roundoff (eps), and the underflow level, UFL.

Which one of these two quantities,

(b) depends only on the number of digits in the mantissa field?

(c) depends only on the number of digits in the exponent field?

(d) does *not* depend on the rounding rule used?

(e) is *not* affected by allowing subnormal numbers?

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1.47. (a) Explain why a divergent infinite series, such as:

sum (1/n), n=1 . . . Inf can have a finite sum in floating-point arithmetic.

(b) At what point will the partial sums stop to change?

REVIEW - CHAPTER 1

1.42. Assume a decimal (base 10) floating-point system having machine precision eps=10^(-5) and an exponent range of ±20. What is the result of each of the following floating-point arithmetic operations?

(a) $1 + 10^{-7}$

(b) $1 + 10^3$

(c) $1 + 10^7$

(d) $10^{10} + 10^3$

(e) $10^{10}/10^{-15}$

(f) $10^{-10} \times 10^{-15}$