Roundoff Error

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Roundoff Error is the difference between an approximation of a number used in computation and its exact (correct) value. In certain types of computation, roundoff error can be magnified as any initial errors are carried through one or more intermediate steps.

An egregious example of roundoff error is provided by a short-lived index devised at the Vancouver stock exchange (McCullough and Vinod 1999). At its inception in 1982, the index was given a value of 1000.000. After 22 months of recomputing the index and truncating to three decimal places at each change in market value, the index stood at 524.881, despite the fact that its “true” value should have been 1009.811.

Other sorts of roundoff error can also occur. A notorious example is the fate of the Ariane rocket launched on June 4, 1996 (European Space Agency 1996). In the 37th second of flight, the inertial reference system attempted to convert a 64-bit floating-point number to a 16-bit number, but instead triggered an overflow error which was interpreted by the guidance system as flight data, causing the rocket to veer off course and be destroyed.

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