

1.5 Algorithms

In general, algorithms are the ideas behind a computer program or a certain program routine, describing the steps that are necessary to reach a certain goal. Algorithms are independent of any programming language; an actual program routine is an implementation of an algorithm. Algorithms must be unambiguous, they must take care of every situation possibly occurring, and they must have a well-defined termination.

A given numerical task may be handled by different algorithms that usually vary in effectiveness (number of necessary steps, scaling behavior) and reliability (stability, accuracy). For a fast execution on a computer, however, not only is the chosen algorithm of importance but also its implementation. It is possible to have a highly effective algorithm badly implemented and thereby end up with unnecessary long execution times. On the other hand, sometimes one can finish a task quicker by using a simpler algorithm which can be implemented and tested without much effort.