Alan Turing and the Limits of Computation
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Computability studies which problems can be computed and which cannot be computed. This goes to the very limits of what is knowable. Turing developed the theory of computability by finding mechanical procedures to compute things, and also devised appropriate definitions of what algorithms are. This is the way Mathematics must be understood at a fundamental level with axioms. Eventually, this leads to the very notion of mathematical creativity. Turing showed what things we can compute in a very precise and universal way, but he also proved that there are things that we cannot compute. After explaining the limits of computability, including examples, the natural question is: can we go beyond? This depends on what is called the Turing barrier. Some alternatives to Turing computation are discussed, including quantum computation. Turing's work is given some historical perspective with respect to some of his precursors, contemporaries and mathematicians who developed his ideas farther.