1023-68-7 **Margaret H. Wright*** (mhw@cs.nyu.edu), Computer Science Department, New York University, 251 Mercer Street, New York, NY 10012. *A Tale of Three Complexities: the Worst of Times, the Best of Times, the Spring of Hope.*

Given a problem, the first question is: how can we solve it? Thinking more broadly about a class of problems, we would then like to know how hard it could possibly be to solve any problem in the class. And if we are really planning to compute the solution and not just to think about it, we also care about how hard the solution process is *likely* to be. Therein lies a fascinating conundrum, since all problems in the same category are not necessarily similar, or even close, in difficulty. In fact, for several well known problem classes and algorithms, there is a huge gap, not yet fully explained mathematically, between the worst case and what happens most of the time. This talk will consider a variety of examples of this phenomenon, focus on what might make some problems hard (or easy), and sketch recent work that offers hope for an improved mathematical understanding of their complexity. (Received September 26, 2006)