

1023-D1-52

Bill Marion* (Bill.Marion@valpo.edu), Department of Mathematics and Computer, Science, Valparaiso University, Valparaiso, IN 46383. *Computer Science, Strong Induction and Pile-Splitting.*

In computer science mathematical induction is a fundamental tool for proving algorithms correct. Strong induction is especially useful because of the deep connection between induction proofs and recursive algorithms. Examples abound. However, in most discrete mathematics texts few examples exist, independent of application context, to demonstrate the power of the strong form. One nice example, the pile-splitting problem (and some of its variants) will be presented. It goes like this. Given n objects in a pile, split the objects into two smaller piles. Continue to split each pair into two smaller piles until there are n piles of size one. At each splitting do some computation on the size of the two smaller piles. Once there are n piles do some additional computation on the intermediate results, such as adding or multiplying them together. The final computation will always be the same no matter how each of the piles is split into two smaller piles and the result can be written as a function of n . In addition to the pile-splitting problem, there will be one or two examples of the application of the strong form to problems in computer science. (Received July 17, 2006)