

## **Book Number** – John Motil (CS0-CS1-CS2)

*BookNumber, or BookCode, is a small, but surprising assignment, that can be revisited many times in many ways. It is based on ISBN, the International Standard Book Number, which most students have seen on their books, but few students are aware of its structure and error detecting code.*

*The ISBN code consists of 9 decimal digits and a tenth check symbol. This check symbol serves to detect errors if some of the 9 digits are improper.*

*There is a simple but interesting algorithm relating the digits to the check symbol. This algorithm can be implemented in many ways, and the data could be represented in many ways also.*

*This assignment, to determine the check symbol (a digit or the character 'X'), can be done very early with nine separate digits, then with integers, later with strings, again later with arrays, and finally in CS2 with trees. This emphasizes the many possible implementations of a single object.*

*Some surprises involve ISBNs with leading zeros (books written in English have zero as the first digit). Others involve converting between digits and characters in many ways. Another surprise involves many different algorithms to compute the ISBN. A final surprise is that the algorithm which involves the sum of products, can be done without using any products; no multiplication!*