

Programming Assignment 1

Preliminaries

Download "Concrete Mathematics" by Graham, Knuth, and Patashnik. You can find several pdf copies online, for example from the Digital Archive.

Read the chapter on the Josephus Problem in Concrete Mathematics and the wikipedia article on the Josephus problem in Computer Science.

Consume (if necessary), the mp4 on implementing double linked lists.

Problem 1:

According to Josephus, the remnant of Jewish soldiers in the great revolt of 66-73 committed collective suicide with an elaborate ploy where they put themselves in a circle, started with a random position counted to n , have the one with count $n - 1$ kill the one with count n , and then continue, now with one less soldier, until all but one soldier was left. In this way, only one would be forced to commit suicide. According to Josephus' account, he plotted so that he was the last one left and then did not commit suicide, but switched to the Roman side, becoming a protégée of Vespasian and Titus.

Use the doubly linked list implementation in Python to find out the position of the survivor of the planned killings for various numbers of soldiers and various numbers of n .

Handin: Code, Test cases, In-line manual entries

Problem 2:

The following is an NFA that accepts certain binary strings. Implement it in Python. (There are a number of ways to do this. You can transform the NFA into a DFA or you can maintain a list of states where the automaton can be after a prefix of the string.)

