

Problem 1

The Berlekamp–Massey algorithm is an algorithm that will find the shortest linear feedback shift register (LFSR) for a given binary output sequence.

The algorithm will also find the minimal polynomial of a linearly recurrent sequence in an arbitrary field.

1. Please write a program based on Berlekamp–Massey algorithm to find the shortest linear feedback shift register (LFSR) for the given sequence down below.

- 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0, 1, 0, 1, 0, 0, 0, 1, 1, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 1, 0, 1, 0, 0, 0, 0, 1, 1, 1, 0, 0, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 1, 1, 0, 1, 0, 1, 1, 0, 1, 1, 1, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 0, 1

You may refer <http://bma.bozhu.me/>

Problem 2

1. Find the sequence generation rule of 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610.....

2. Extra credit

Use Berlekamp–Massey algorithm to find out the sequence rule of 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

HINT 0,1,1,2,3,5,8,13,21,34...

$$s(x) = x^8 + x^7 + 2x^6 + 3x^5 + 5x^4 + 8x^3 + 13x^2 + 21x + 34$$

$$r(x) = x^9$$

欲求次數小的 $c(x)$ 使得 $f(x)r(x) + c(x)s(x) = b(x)$ · $\deg b < \deg c$

A

B

列表

算式

	$f(x)$	$c(x)$	$b(x)$
(1)	1	0	x^9
(2)	0	1	$x^8 + x^7 + 2x^6 + 3x^5 + 5x^4 + 8x^3 + 13x^2 + 21x + 34$

Hand-in Policy

1. For problem 1, please provide a programming file (language: python) → {YOUR_STUDENT_ID}.py
2. For problem 2, please provide a description file about the procedure for you to obtain the result
 - With clear numbering for the first sub-problem and the bonus if you would like to submit it
 - Format: {YOUR_STUDENT_ID}.pdf
3. Zip the two files in {YOUR_STUDENT_ID}.zip and hand in the zip file to new E3
4. Deadline: 4/13 18:35