

Quiz 5

Problem 2

1. Find the sequence generation rule of :

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

$$\Rightarrow a_0 = 0$$

$$a_1 = 1$$

$$a_n = a_{n-1} + a_{n-2}, \forall n \geq 2$$

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

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

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

Find $c(x)$ such that $f(x)r(x) + c(x)s(x) = b(x)$, $\deg b < \deg c$

Formula No.	f(x)	c(x)	b(x)
(1)	1	0	x^9
(2)	0	1	$x^8 + x^7 + 2x^6 + 3x^5 + 5x^4 + 8x^3 + 13x^2 + 21x + 34$
(3): (1) - (2) * (x - 1)	1	$-x + 1$	$-x^7 - x^6 - 2x^5 - 3x^4 - 5x^3 - 8x^2 - 13x + 34$
(4): (2) - (3) * (-x)	x	$-x^2 + x + 1$	$55x + 34$

$$\Rightarrow c(x) = -x^2 + x + 1$$

Division :

$$x^9 = (x^8 + x^7 + 2x^6 + 3x^5 + 5x^4 + 8x^3 + 13x^2 + 21x + 34)(x - 1) + (-x^7 - x^6 - 2x^5 - 3x^4 - 5x^3 - 8x^2 - 13x + 34)$$

$$\begin{aligned} & x^8 + x^7 + 2x^6 + 3x^5 + 5x^4 + 8x^3 + 13x^2 + 21x + 34 \\ &= (-x^7 - x^6 - 2x^5 - 3x^4 - 5x^3 - 8x^2 - 13x + 34)(-x) + (55x + 34) \end{aligned}$$

Validation :

 $\downarrow c(x)$

(-) 1 1 2 3 5 8 13 21 34

(+) 1 1 2 3 5 8 13 21 34

(+) 1 1 2 3 5 8 13 21 34

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1 0| 0 0 0 0 0 0 0| 55 34
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 $\uparrow f(x)$ $\uparrow b(x)$