Quiz 5

109550135 范恩宇

Problem 2-1

It’s similar to Fibonacci sequence , for n>=2 , every nth number will be the sum of n-1th and n-2th number .

Problem 2-2

1. First, initialize the LFSR to length = 1 and set it to the first element of the sequence: LFSR = (0)
2. Compute the discrepancy between LFSR output and the next element of the sequence , and the discrepancy is the difference between the predicted value and the actual value . In the former case , the predicted value is the only value in LFSR , making discrepancy be the same as the next element of the sequence. For example , the discrepancy between LFSR = (0) and the next element of the sequence(1) , is also 1.
3. Update the coefficients of LFSR . First , compute a new LFSR using the previous one and the discrepancy . The new LFSR’ll be the sum of the previous LFSR , the product of the discrepancy , and a shifted version of previous LFSR(last element removed) .

4. Repeat steps 2 and 3 for each subsequent element in the sequence.

   The following are steps for the first few elements:

   - LFSR = (0)
   - Discrepancy between LFSR = (0) and 1 is 1.
   - Update coefficients: LFSR = (0) + 1*() = (0)
   - Discrepancy between LFSR = (0) and 1 is 1.
   - Update coefficients: LFSR = (0) + 1*(0) = (0)
   - Discrepancy between LFSR = (0) and 2 is 2.
   - Update coefficients: LFSR = (0) + 2*() = (0)
   - Discrepancy between LFSR = (0) and 3 is 3.
   - Update coefficients: LFSR = (0) + 3*(0) = (0)

   We can see that LFSR hasn't changed after processing the first four elements of the sequence , which means that the minimum LFSR capable of generating the first four elements of the sequence has length 1 and consists of a single tap.

   Continue the process for the full sequence , then we can get the following LFSR : [0,1,1,0,1,1,1,0,1] . Thus , the rule for the requested sequence is generated by LFSR with coefficients [0,1,1,0,1,1,1,0,1] .