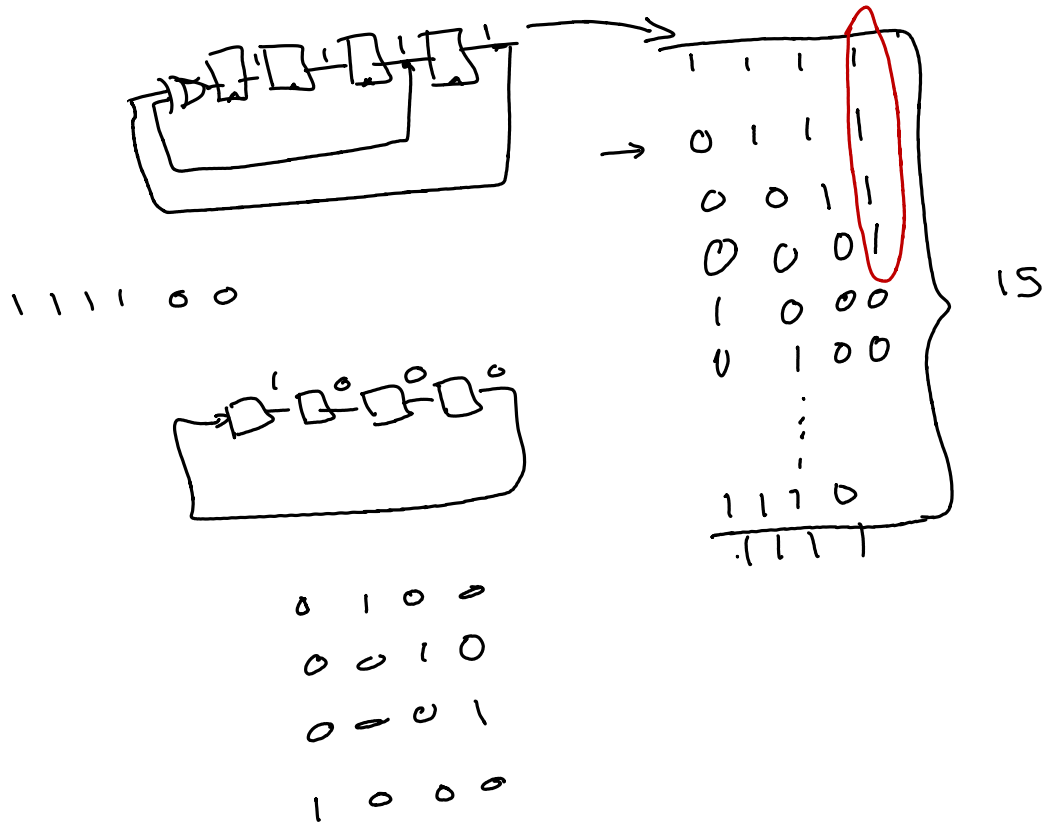


PN Sequences and Scramblers

Exercise 1: How many bits are there in an m-sequence for $m = 6$?
How many are 1's? How many are 0's?

$$2^m - 1 \quad 2^6 - 1 = 63 \quad \begin{cases} 32 \text{ 1's} \\ 31 \text{ 0's} \end{cases}$$

Exercise 2: If the initial value of each flip-flop is 1, what are the values of the next 4 bits output by the right-most flip-flop?



Exercise 3: How many flip-flops would be required to generate a ML PRBS of period 8191? How many ones would the sequence have? What is the longest sequence of 0's?

$$8191 = 2^m - 1$$

$$2^m = 8191 + 1 = 8192$$

$$4096 \text{ 1's}$$

$$m = \log_2(8192)$$

$$= \log_2(8) + \log_2(1024)$$

longest sequence of
1's is 13

$$= 3 + 10 = 13$$

of 0's is 12

Exercise 4: Why not?

all descramblers work the
same way.

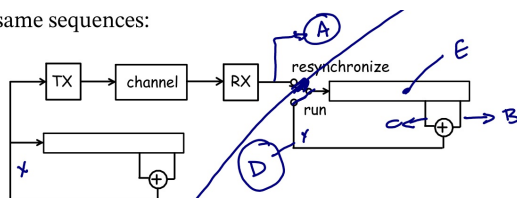
Exercise 5: How many errors will appear in the output of a V.34 descrambler if there is one input error?

3 (one for input
one for each tap)

Exercise 6: In the diagram above, what two signals would the receiver compare to detect errors?

- output of receiver
- output of receive-side PRBS

same sequences:



(A) & (D)