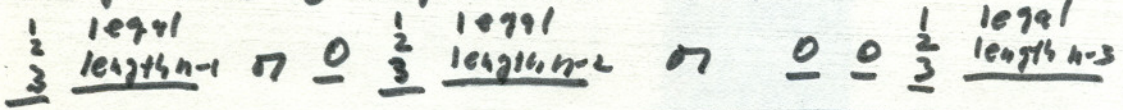


9) A code word is made from the alphabet  $\{0, 1, 2, 3\}$ . A word is legal if it does not have 3 zeros in a row. Find a recurrence relation which gives the number of legal code words of length  $n$ . Let  $b_n = \#$  of legal words of length  $n$ .

$b_1 = 4$   
 $b_2 = 4^2 = 16$   
 $b_3 = 4^3 - 1 = 63$

A legal word of length  $n$  looks like



$\therefore b_n = 3(b_{n-1} + b_{n-2} + b_{n-3}) \quad b_1 = 4, b_2 = 16, b_3 = 63$

1) Five women leave their coats in a coat room while attending a concert. After the concert each woman retrieves a <sup>random</sup> coat from the coat room. What is the probability that no one leaves with her own coat?

sample space = all permutations of the 5 coats

"Successful Events" = all derangements of the 5 coats

Prob =  $\frac{D_5}{n!} = \frac{44}{120} = .366$