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Quiz over week 6 and 7 material

1) a) a0 = -10, an = an-1 + 5

b) a0 = 0, an+1 = an + 2n

2) a) basis step: F(1) = 7

recursive step: F(n+1) = n + 2

b) let λ be the empty string.

basis: λ € S. ­

recursive step: b € S --> b00 € S and b01 € S and b10 € S and b11 € S.

3) **Base case**: 1 + 0 = 1, which is odd, and 0 + 1 = 1 which is odd. True that a + b is odd for base case

**recursive case**: assume that a + b = an odd number.

We must show that the case (a + 1, b+1) = an odd number. This is true because for our two base cases (1,0) and (0,1)

the first base case would be (1 + 1, 0 + 1 ) which is (2, 1) and 2 + 1 = 3, an odd number

the second base case would be (0 + 1, 1 + 1) which is (1,2) and 1 +2 = 3, an odd number.

I have proved with structural induction that a+b is odd for any (a,b) in the set S.

4) 6 possible letters in 10 positions = 6 ^ 10 = 60,466, 176

5 possible letters in each 10 positions = 5^10 = 9,765,625

Possible solutions that has at least an 'a' = 60,466,176 - 9,765,625 = 50,700,551 ways

5) a) Since the worst case scenario is that we draw different colored balls every single draw, then 8 draws would mean 2 balls of 4 different colors. Then the 9th draw would guarantee us 3 balls of the same color. The answer is n = 9.

b) To get at least 3 balls, there is a chance that a person can pick every single ball first before the blue balls, so since there are 10 red, 20 green, 20 yellow, thats 50 total. That means 53 is is the largest n should be to guarantee a person gets 3 blue balls.