

Section 8.1

7.

a) Find a recurrence relation for the number of bit strings of length n that contain a pair of consecutive 0s.

$$a_n = a_{n-1} + a_{n-2} + 2^{n-2} \text{ for } n \geq 2$$

b) What are the initial conditions?

$$a_0 = 0, a_1 = 0$$

c) How many bit strings of length seven contain two consecutive 0s?

$$a_2 = 0 + 0 + 2^{2-2} = 1$$

$$a_3 = 1 + 0 + 2^{3-2} = 3$$

$$a_4 = 3 + 1 + 2^{4-2} = 8$$

$$a_5 = 8 + 3 + 2^{5-2} = 19$$

$$a_6 = 19 + 8 + 2^{6-2} = 43$$

$$a_7 = 43 + 19 + 2^{7-2} = 94$$

Thus, there are 94 bits strings of length seven contain two consecutive 0s.