5.4.13 *Challenging REs.* Construct an RE that describes each of the following sets of strings over the binary alphabet:

a. All strings except 11 or 111

b. Strings with 1 in every odd-number bit position

c. Strings with at least two 0s and at most one 1

d. Strings with no two consecutive 1s

Solution:

1. All strings except 11 or 11: $1|(1^*01|1111(0|1)^*))^*$
2. Strings with 1 in every odd-number bit position: $(10|11)^*1^*$ OR $1((0|1)1)^*$
3. Strings with atleast 2 0's and at most one 1: $(1(00)^+|0^+10^+|(00)^+1)$
4. Strings with no 2 consecutive 1's: $(1(0|01)^*|0(0|01)^*)$ OR $0^*(10^+1)^*0^*$