9) Exercise 3.1.4

(a) This expression is another way to write "no adjacent 1's." $(00*1)^*$ says every 1 is preceded by at least one 0. $0^*$ at the end allows 0's after the final 1, and $(\varepsilon+1)$ at the beginning allows an initial 1, which must be either the only symbol of the string or followed by a 0.

(b) This expression is another way to write “all strings with at least one substring of three consecutive 0’s.” $(0*1^*)^*$ and $(0+1)^*$ are two ways of saying, any combinations of 0’s and 1’s. What stays constant is the “000” substring.

(c) This expression accepts strings where no consecutive 1’s occur to the left of any 0’s. $(0 + 10)^*$ pads every one with a 0 so that no two 1’s can be adjacent. Solutions describing these characteristics received full credit.

10) Write a regular expression for all strings of 0’s and 1’s such that every odd numbered 0 is immediately followed by a 0, i.e. the 0’s occur in pairs.

$(1 + 00)^*$