

ECE374 SP23 HW1

Ziyuan Chen – ziyuanc3

Zhirong Chen – zhirong4

Problem 3

3: (a). $(0+1)^*1011$.

Explanation: $(0+1)^*$ denotes any string of any length.

(b). $\epsilon + 0 + 1 + 00 + 01 + 10 + (0+1)^*(0+1)(0+1)(0+1)$.

$\epsilon + \phi + (0+10+11(1+0))(1+0)^*$.

Explanation: For the first regex, we list strings with $|w| \leq 2$ excluding 11 as well as those with $|w| \geq 3$.

For the second regex, strings in the language either

(1). doesn't contain 0 and $|w| < 2$,

(2). contains 0 in the first two symbols, or

(3). doesn't contain 0 in the first two symbols & $|w| > 2$.

(c). $(0+1)^*101(0+1)^* + (0+1)^*010(0+1)^*$.

$(0+1)^*(101+010)(0+1)^*$.

Explanation: Concatenate any string before & after the desired substrings and we get the complete set.

(d). Twenty $(0+1)^*a_i(0+1)^*b_i(0+1)^*c_i(0+1)^*d_i(0+1)^*e_i(0+1)^*f_i(0+1)^*$ terms "added" (ORed) together. Each $a_ib_ic_id_ie_if_i$ represents a way to put three 1's and three 0's in a row.

Explanation: $C_6^3 = 20$. We insert one of the 20 combinations into any str.

(e). $(0+10+110)^*(\epsilon+1+11)$.

Explanation: For at most two 1's, there must be a following 0. (except at the end of string where no more than two 1's may be present).