

This is a 50-minute in class closed book exam. All questions are straightforward and you should have no trouble doing them. Please show all work and write legibly. Thank you.

1. Let L be the set of strings of 0's and 1's with an even number of 0's. Strings with zero 0's have an even number of 0's. Write a regular expression for L .

2. Consider the set

$$\{0^i 10^{2i} 1 \mid i \geq 1\}^* \cap 01 \{0^i 10^{2i} 1 \mid i \geq 1\}^* 0^* 1$$

Write down a string of length 19 in the set.

What is the length of the shortest string in the set of length greater than 19?

3. Let $L \subseteq (a+b)^*$ be a set of strings. In each string in L delete every b immediately following an a . Using $h, h^{-1} \cap R$ applied to L write an expression for the resulting set of strings.

4. Let $L \subseteq (a+b)^*$ be the set of strings which scanned from left to right the number of a 's never exceeds the number of b 's. Is L regular or not? Give a proof of your answer.