

**TEST ONE**  
**Regular Expressions and Lexical Analysis****NAME:**  
**ID:**

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**QUESTION 1** (5 points)

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Encircle/mark the strings defined by the regular expression:  $c? a b^* c$ 

cbbbbc

cabc

abbc

cac

abccccc

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**QUESTION 2** (6 points)

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Given the following lexical specification:

if	IF
$[a-z][a-z0-9]^*$	ID
$[0-9]^+$	NUMBER
ifelse	IFELSE
$\sim[.]$	BADCHAR <sup>1</sup>

Assuming whitespaces are ignored. Write the tokens generated by the lexical analyser for each of the strings below. Note that “words” can be split into more than one token.

- x78 if 45 &
- 78x ifelse 0
- x\$\$98

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**QUESTION 3** (2.5 points)

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Given alphabet  $\{x, y\}$ , what regular expression defines the set of strings that always contain at least one character ‘y’? Choose one from below:

y

 $(x|y)^* y^* (x|y)^*$  $(x|y)^* y (x|y)^*$  $(x|y)^+$  $x^* y x^*$ 

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**QUESTION 4** (2.5 points)

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An **odd number** is an integer that is NOT divisible by two. For example, 1,3,7,19 and 25 are odd numbers. Write down a regular expression that specifies odd numbers (Hint: What can you say about the last digit of an odd number?)

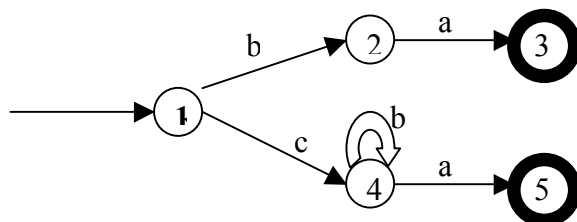
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<sup>1</sup> Note that BADCHAR accepts a single character.

## QUESTION 5

(5 points)

Given the following Finite Automaton:



a. From the list below, encircle/mark the strings accepted by the DFA (3 points):

ca

cba

cb

ba

cbbbbba

cab

What regular expression describes the DFA above? Choose only one. (2 points)

 $b \mid (c b^* a)$  $(c b^* a) \mid ba$  $ba \mid (c b^+ a)$  $(c b^? a) \mid ba$ 

## QUESTION 6

(4 points)

Draw a deterministic finite automaton (DFA) that accepts hexadecimal literals (e.g. 0x12, 0xA1, 0xFF) according to the following grammar:

$$0x ([A-Z] \mid [0-9])^+$$

Remember that each transition/arrow of the DFA accepts/reads one character at a time.