**THE KENNESAW STATE UNIVERSITY**

**STUDENT CODES OF CONDUCT**

<https://ksuowls.com/documents/2021/8/27/SA_Code_of_Conduct_21_22.pdf>

As a member of the Kennesaw State University community of scholars, I understand that my actions are not only a reflection on myself, but also a reflection on the University and the larger body of scholars of which it is a part. Acting unethically, no matter how minor the offense, will be detrimental to my academic progress and self-image. It will also adversely affect all students, faculty, staff, the reputation of this University, and the value of the degrees it awards. Whether on campus or online, I understand that it is not only my personal responsibility, but also a duty to the entire KSU community that I act in a manner consistent with the highest level of academic integrity. Therefore, I promise that as a member of the Kennesaw State University community, I will not participate in any form of academic misconduct.

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ KSU ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Types of Academic Misconduct:

1) Cheating. Receiving, attempting to receive, knowingly giving or attempting to give unauthorized assistance in the preparation of any course work (including, but not limited to, examinations, laboratory reports, essays, themes, term papers) is considered cheating, as is engaging in any behavior that a professor prohibits as academic misconduct in the syllabus or class discussion. Unless specifically authorized, using and/or having access to electronic devices during an examination, quiz, test or other assessment is automatically considered cheating, regardless of the student’s reason for using/accessing the device. Additionally, unauthorized collaboration and sharing of materials in an electronic group chat is cheating and said participation shall be determined by an evaluation of all facts available regarding participation.

2) Plagiarism. Including direct quotations from other sources into work required to be submitted for credit without indicating them as such by quotation marks, block quotes or other appropriate formatting. Incorporating the work of someone (e.g. ideas, theories, data, figures, graphs, programs, electronic based information, illustrations, etc.) into a paper or project without due acknowledgement;

3) Self-Plagiarism. Submitting any work for credit which was not authored specifically and originally for the assignment in question without the prior permission of the professor receiving that assignment. Most commonly, this means submitting the same, or substantially the same, paper or other assignment for credit in more than one class;

4) Misrepresentation and/or Falsification. Knowingly providing false information in completing University forms or applications (including admissions forms, scholarship applications, time sheets, false or counterfeit transcripts, etc.) or in any work related to a course at KSU. This includes providing fabricated/altered documents to substantiate an excused absence (such as to meet attendance requirements or have the chance to make up a missed exam). Signing in for another student or having another individual sign in on a student’s behalf on an attendance sheet also constitutes a violation of this code section.

5) Unauthorized Access to University Materials. Taking, attempting to take, stealing or in any unauthorized manner otherwise procuring, gaining access to, altering or destroying any material pertaining to the conduct of a class (including tests, examinations, grade change forms, grade rolls, roll books, laboratory equipment, University grade records in written or computerized form, etc.).

6) Malicious/Intentional Misuse of Computer Facilities/Services. Maliciously or intentionally misusing university-controlled computer facilities and services. This includes violations of state and federal laws (e.g. copyright violations, unauthorized access to systems, alteration/damage/destruction, or attempted alteration/damage/destruction, use for profit, etc.) or a department's rules for computer usage (e.g. account violations, damage, or destruction of the system and/or its performance, unauthorized copying of electronic information, use of threatening or obscene language, etc.).

7) Malicious Removal, Retention or Destruction of University Resource Materials. Misplacing, taking, destroying any item or part of an item belonging to or in the protection of the University (or the attempt thereof) with the intention of bringing about an undue disadvantage in the academic pursuits of other Kennesaw State University students.

**CS 6041 Theory of Computation**

**Exam 1 (total: 100 points)**

**Full Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ KSU Email Address:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score:\_\_\_\_\_\_\_\_**

**Make sure you follow the instruction before submission:**

**1, Any late submission due to whatever reason will not be graded.**

**2, For the 10 T/F questions, your answer must be filled in the table. The answer should be written in BLUE and the figure can be any color. Figures or math symbols can be hand-written. The wrong format might also not be considered.**

**3, The submission file must be in PDF.**

**4, This exam content is protected by KSU intellectual property rules, and do not share with or upload to third parties.**

1. True/False with Brief Justification (2 points for each statement; total 20 points)

Please answer either **True** or **False** to each of the following statements. You must also provide a valid brief (at most three sentences) **justification** to explain each of your answers.

Please also write T/F here for easier grading:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|  |  |  |  |  |  |  |  |  |  |

1. For a given specific DFA, if one language X is not recognized by it, then X must be a non-regular language.

Answer: False

1. If a regular language C has a finite number of strings concatenated to it, the new resulting language remains regular.

Answer: True

1. The language {ε 01 ∪ 0011 ∪ 000111 ∪ … } is a regular language.

Answer: False

1. If A is a regular language and B ⊆ A, then B must necessarily be finite.

Answer: False

1. Non-deterministic Finite Automata (NFAs) are capable of recognizing a wider class of languages compared to regular expressions.

Answer: False

1. The regular expression that generates the language consisting of all strings over Σ = {0, 1} having an odd number of 0’s is

Answer: True

1. If A, B and C are regular languages, then is also regular.

Answer: True

1. Every Non-deterministic Finite Automaton can be regarded as a specific instance of a regular expression and vice versa.

Answer: True

1. If one language is not a regular language, and X is the subset of that language, then X is also not regular language.

Answer: False

1. The empty set is not considered a regular language.

Answer: False

1. Please draw the **state diagram** for a DFA that recognizes the language C = {w | the 1st letter of w is a, and the last letter of w is b}; here, the alphabet of the language is {a, b}.

Also, write the **regular expression** that represents C.

(20 points)

Answer:

ε

a

a,b

b

b

a

1. Please provide a regular expression that matches the language accepted by this NFA; here, the alphabet of the language is {a, b, c}. (20 points)

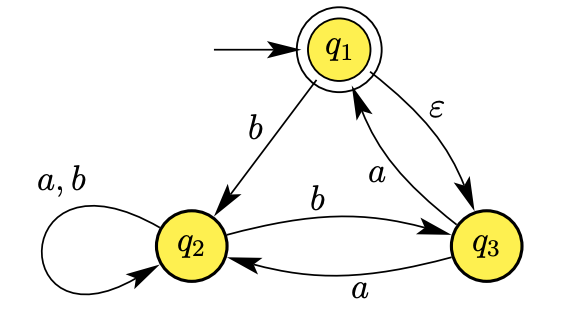
A diagram of a diagram

Description automatically generated

Answer:

(a | bc)

1. Here, the alphabet of the language C is {a, b}, and the following NFA generates the language.
2. Please list all strings in C whose length 3
3. Please draw one equivalent DFA for language C. (20 points)



Answer:

1. aab

aba

abb

bab

bba

(2)

ε

a

a,b

b

b

a

1. Please use the pumping lemma to prove the language C is not regular. C = {3n2n1n | n ≥ 0}, where the alphabet is {1, 2, 3}. (20 points)

Answer:

Pumping Lemma:

For any regular language L, there exists a positive integer n such that for all strings w in L with |w| ≥ n, we can write w = xyz, where:

|xy| ≤ n

|y| ≥ 1

For all i ≥ 0, xyiwz ∈ L (i.e., inserting any number of copies of y between x and z preserves membership in the language)

Applying the Pumping Lemma to Language C:

Choose the pumping length: Let's choose n = 3 (any value greater than 1 would work).

Take w = 3^32^31^3, which belongs to C and has length |w| = 9 > n.

Decompose w as xyz: We can divide w into xyz as follows:

x = 3^3 (length 3)

y = 2 (length 1)

z = 2^21^3 (length 6)

Here, |xy| = 4 ≤ n and |y| = 1, satisfying conditions 1 and 2 of the pumping lemma.

Check for violation: Now, we need to see if for any i ≥ 0, xyiwz is still in the language C.

i = 0: xyz = 3^322^21^3. This string is not in C because it has one "2" and three "1"s, violating the pattern 3n2n1n.

i = 1: xyiwz = 3^3222^21^3. This string is also not in C for the same reason.

Contradiction:

We have found that for i = 0 and i = 1, xyiwz does not belong to C, contradicting condition 3 of the pumping lemma. This implies that there exists a string in the language for which the pumping lemma does not hold. Therefore, language C cannot be regular.

Conclusion:

By using the pumping lemma and demonstrating a violation of its properties, we have proven that the language C = {3n2n1n | n ≥ 0} is not regular.