Program: BSc Computer Science
Course code: BCS1110
Examiners: dr. Ashish Sai & dr. Thomas Bitterman
Date/time: 24-Oct-2023, 17:00 to 19:00
Format: Closed book exam
Allowed aids: Pens, simple (non-programmable) calculator from the DACS list of allowed calculators

Sample Exam Paper

BCS1110
2023/24

Multiple Choice Question

Instructions: For the following multiple-choice questions (MCQs), only one answer is correct. Please select the most appropriate option.

3p **1a** Example multiple choice question. I think the instructor for this class is really mean because:

(a) He gives us really long, mean assignments
(b) He makes us show up for class on time
(c) He asks mean multiple choice questions
(d) None of the above. He is, in fact, sweet and charming

3p **1b** According to Moore's Law, approximately how often was the number of transistors on a computer chip supposed to double?

(a) Every 1 year
(b) Every 2 years
(c) Every 5 years
(d) Every 10 years

3p **1c** In a deterministic finite automaton (DFA), what is the number of transitions defined for each symbol in the alphabet for every state?

(a) Zero
(b) One
(c) More than one
(d) Two

3p **1d** Which service is NOT typically part of Amazon’s AWS?

(a) Amazon S3 (Cloud Storage)
(b) Amazon Kindle
(c) Manages Servers
(d) Website Hosting

3p **1e** Which of the following is NOT a common method used in Two-Factor Authentication (2FA)?

(a) Something you know (password)
(b) Something you have (mobile device)
(c) Something you like to eat (a type of food)
(d) Something you are (fingerprint)

3p. **1f** Which encryption uses a different key for encrypting and decrypting data?

(a) Symmetric
(b) Asymmetric
(c) Monometric
(d) CSRF

Course Theme and Computing Hardware

3p **2a** Identify some advantages and disadvantages of a using a Biometric authentication system in a company (Hint: think about privacy)?

↳

6p **2b** Convert the following binary numbers to decimal:

a. $(01101)_2$
b. $(011110)_2$
c. $(1011000)_2$
d. $(111111)_2$
e. $(1101)_2$
f. $(111110)_2$

2p **2c** Complete the truth table for the logical statement A OR (B AND (NOT C)) and draw the circuit diagram for this system (**2d**) .

4p **2d** :

Algorithm and version control

4p **3a** Name a type of algorithm that is not a program

6p **3b**: Create a flowchart and pseudocode for the process of getting ready to leave the house in the morning. Include such activities as hitting the snooze button several times, taking a shower, getting dressed, and so on. Make sure to have different procedures depending on whether it is a weekday or weekend

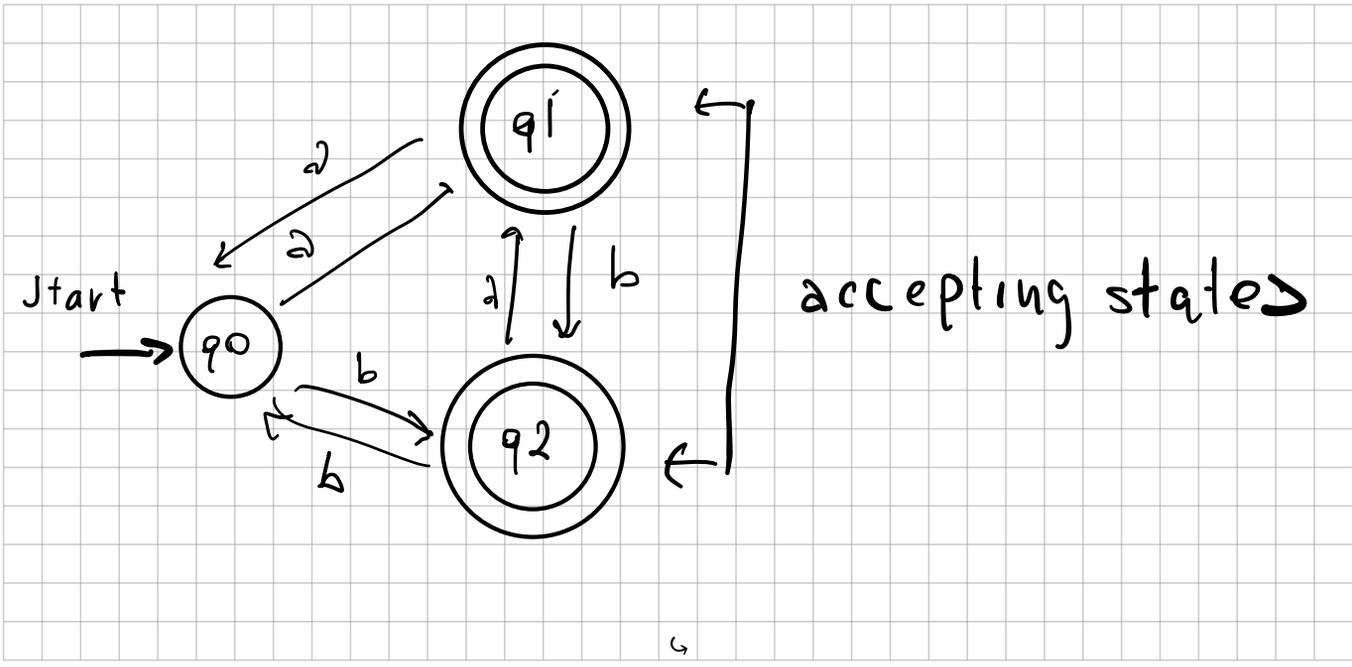
Theory of Computation

4p **4a** Explain the concept of closure properties of regular languages.

8p **4b** Let Σ = {a, b} and let L = { w ∈ Σ* | w is a nonempty string whose characters alternate between a's and b's }. Design a DFA whose language is L.

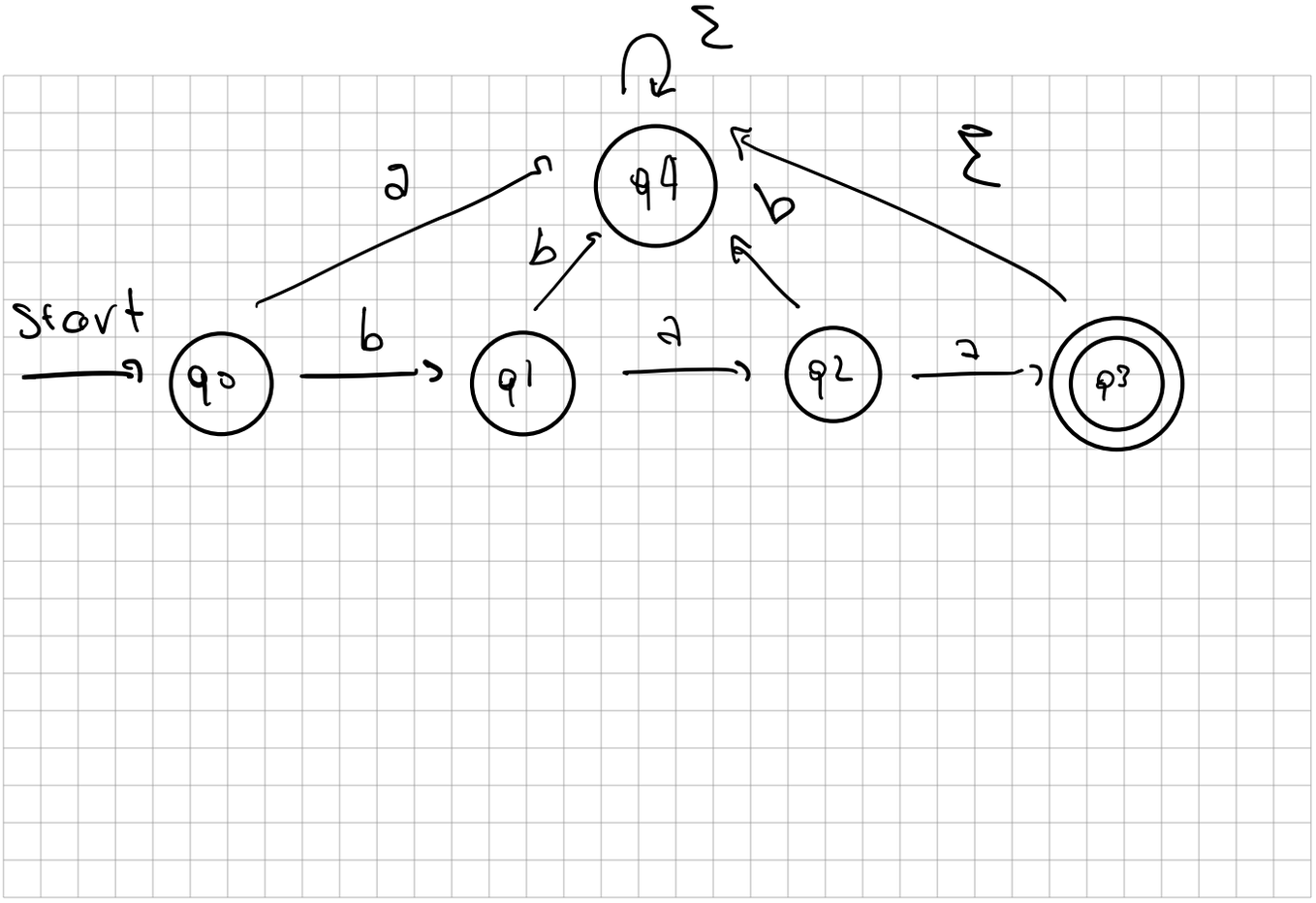
Some example inputs for this automata:

Valid - abababababa
Invalid - abaa



2

6p **4c** Let Σ = {a, b} and let L = {baa}. Design a DFA for L.



Computer Networks

4p **5a** Explain what is IPv4. Why was there a need to move from IPv4 to IPv6?

6p **5b** What are the different types of IP addresses (static, dynamic) and where are they typically used?

Static address -> they do not change (useful for web servers)
Dynamic address -> they change frequently (common for phones/laptops)

4p **5c** Why do we need a transport layer in TCP/IP? Name at least two protocols used in this layer

- Standardized end-to-end communication and data integrity; data segmentation for transfer. Protocols in this layer:
  TCP -> handles multiplexing and sequencing, receival receipts and sends lost data again. UDP -> less "reliable", more in datagrams

Information Security

4p **6a** Describe the process of Two-Factor Authentication (2FA). Explain how it adds an additional layer of security compared to single-factor authentication.

4p **6b** Explain how Social Engineering attacks occur. Include examples and discuss preventive measures that can be taken.

4p **6c** Describe a type of attack a hacker might perform to steal your data. In your answer, you should include: The name of the attack, a short description of the attack and Why this type of attack could be bad for a user

Physhing attack

Project (JavaCraft)

As a part of this course, you worked on a group project titled **JavaCraft**. In the following questions (7a, 7b and 7c), you should provide answers based on your work on the project.

2p **7a** In order to get which flag to draw, you had to call a function to interact with a website. Can you name this function (or the command you would enter to invoke this function)? If your group did draw a flag, please name the flag you drew.

2p **7b** You had to design a Finite State Automata as a part of your secret door logic, can you draw the FSA you submitted with your project (the FSA does not have to be accurate, we will accept it as a valid solution as long as it somewhat resembles your submission).

2p **7c** Can you name the new blocks you included in your source code?
