CS3470 Assignment 1

Assessment Details And Criteria

This assignment is worth 5% of the final course mark. The questions are not all of the same weight. The marks for each question are shown on the sheet.

To gain all of the marks for Questions 2,4,5 you must also show how you obtained your answer. Some marks will be given for 'correct working or approach' even when the final answer is not correct. For Questions 3-5 the purpose is to understand and use the algorithms specified. Marks will not be given for answers obtained by other means.

You should try all the questions and hand in what you have done, even if you are not able to complete some of the questions. Some marks will usually be given for correct parts of incomplete solutions. Solutions to the assignment will be discussed in a lecture slot after the assignments have been marked.

Submission and feedback arrangements

• Solutions must be submitted in PDF format via the links on the course Moodle page. The submissions must be PDFs not jpeg, Word documents or any other format. You may hand write and then scan your solutions to obtain a PDF file.
Write your name on every page and make sure the printed version is legible.
The mark will be set to 0 if the submission is in the wrong format or not legible.

• In the event of central IT issues at the time of the deadline, inform the course lecturer.

• The assignments will be marked and a feedback grade given. Note, the feedback grades are provisional and subject to change by our External Examiners during the examination moderation process.

• General feedback for this assignment will also be posted on the course webpage on Friday 27th October.

Learning outcomes assessed

The primary purpose of this assignment is formative. It is designed to

- revise regular expressions and finite state automata material from the first year
- provide a focus for reading and understanding the material on regular expressions and finite automata covered in the course
- provide practice in using the associated techniques
- provide you with a way of assessing for yourselves the degree to which you have understood the material

If you do not know how to do a question, begin by reading the corresponding text in the notes and working through related examples discussed in lectures. Please feel free to make an appointment to talk to me about things you don't understand, and remember all solutions must be the submitter's own work. If someone asks you for help you may discuss the material and examples given in class but you should not give any form of help that you would not expect the course lecturer to give.

..../PTO

CS3470 Assignment 1 2017/18

This assignment should be submitted in PDF format via Moodle by **2pm** on **Friday 13th October 2017**. All the work you submit must be solely your own work.

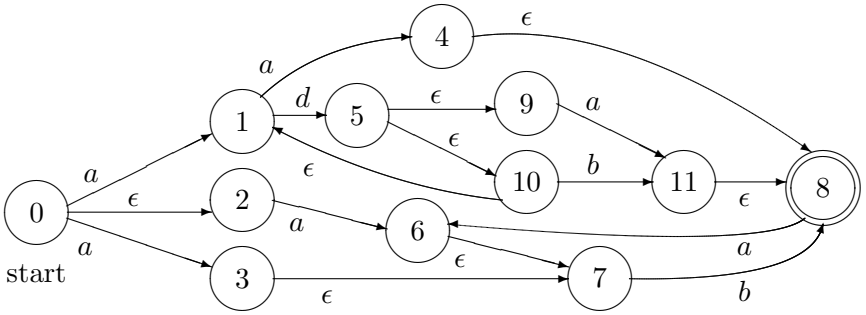
1. **[10 marks]** Let A be the alphabet $\{X, Y, Z\}$. Write down the patterns of the following three regular expressions

$$(i)\ \ Z\ X \mid Z \mid \epsilon$$
$$(ii)\ \ (\ (\ Y \mid Z\ X \mid Y\ )\ Z\ Y\ ) \mid Y\ Z\ Y\ Y$$
$$(iii)\ \ Z\ (\ \epsilon \mid Z\ Y\ ) \mid (\ Y\ Z \mid Z\ (\ Z\ Y \mid Y\ )\ )$$

2. **[11 marks]** For alphabet $\{a, b, d\}$, decide whether the strings (i) *bbbadaba* and (ii) *bbabbadabbadda* are lexemes of the regular expression
$b^*\ (\ a\ d \mid (\ b\ b\ a \mid d\ a\ )^*\ )\ (\ a\ d\ b \mid b\ )\ a$, justifying your answer.

3. **[25 marks]** Give the NFAs produced, by the version of Thompson's construction given in lectures, for (i) $(\ a\ a \mid \epsilon\ )$ and (ii) $(\ a\ a \mid \epsilon\ )(\ a \mid (\ a\ b^* \mid b\ )^*\ )$.

4. **[25 marks]** Use the subset algorithm to construct a DFA which is equivalent to the following NFA.



5. **[29 marks]** Use the dead state method discussed in lectures to minimise the following two DFAs whose start state is 0, whose accepting states are 1,2,3,4, and 5 and whose transition tables are, respectively,

(i)	a	b	c
0	6	1	1
1	2	3	4
2	2	3	4
3	1	1	5
4	5	4	–
5	4	5	–
6	5	–	–

(ii)	a	b	c
0	5	1	–
1	8	–	–
2	–	8	3
3	1	–	–
4	–	–	6
5	4	–	7
6	–	6	9
7	7	6	–
8	9	4	2
9	–	–	–

Draw out the resulting DFAs.