

**Comments** Please see the attached report from Sean Bechhofer. Please contact Dave Lester directly for feedback on his questions.

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# COMP11212 Exam Performance Feedback

## AY15-16

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### General Remarks

There were 177 students who sat the exam. The exam was marked out of 60. The median mark was 39 (65%), and the mean mark 37.5 (62%). There were 13 students with a mark below 24 (40%), 9 of these being below 18 (30%). Some of these students *may* be able to pass the unit with suitable coursework marks. The lowest mark achieved was 4. There were 47 students who achieved first class marks (42 or 70% or above) in the exam.

Answers were distributed as follows: 173 answered Q1, 171 answered Q2, 91 answered Q3 and 89 answered Q4. Table 1 below gives an overview of the performance across questions, along with a breakdown corresponding to degree classifications (fail, third, lower and upper second and first).

Question	Attempts	Marks				
		<7	8-9	10-11	12-13	14+
Q1	173	38	18	35	33	49
Q2	171	27	11	11	13	109
Q3	91	37	3	6	8	37
Q4	89	14	5	5	3	62
		<23	24-29	30-35	36-41	42+
Overall	177	13	11	12	24	47

Table 1: Performance breakdown

### Section A

#### Question 1

The overall performance on Question 1 was fair, with a mean of 10.8 (54%) and median score of 11 (55%). Just over a quarter of the students scored 14 or over.

- 1 a) An overall observation here was that there was a lack of consistency between the answers. In many cases, the languages defined by the DFA in part i), the grammar in part ii) and the regular expression in part iii) were different. The most common mistake was to not include a clause in the regular expression to match words of the form *ababa*. The DFAs given, however, *did* tend to recognise these strings. The answers here were marked leniently, giving credit where appropriate for consistency between answers or answering the question correctly.

There were only a small number of correct answers given to part iv) – this part would have required students to have worked through the Appendix.

The mean mark for 1 a) was 5.1 out of 9 (56%).

- 1 b) Part b) was answered well. A significant number of students gave an automaton directly without any obvious working. This is a dangerous strategy though – incorrect answers with no obvious working were penalised heavily, while incorrect answers that exhibited understanding of the algorithms were given partial credit.

For answers that were given with no working, a common mistake was to miss the fact that after seeing  $ab$  at the beginning of a word, we can still match either side of the alternative. Thus seeing one or more further  $b$ 's means we must then see a single  $c$  to finish. Alternatively, the word could conclude with a string of zero or more  $cs$ .

The mean mark for 1 b) was 5.4 out of 8 (68%).

- 1 c) This was the least well answered part of Question 1. Very few answers provided any reasonable arguments as to why the reversal of a regular language is regular. A number of answers made reference to intersection which is irrelevant here. Answers were also given that simply stated “it is regular because we can reverse a regular expression” without any attempt to *justify* this position – for example defining precisely what it means to reverse a regular expression or indeed prove that the reversed regular expression will match the reversed language.

The topic of this question had been covered in a (non-assessed) exercise. Credit was given for answers that referred to the construction of a DFA for the reverse language or a (coherent) reference to the use of recursion over a regular expression.

The mean mark for 1 c) was 0.4 out of 3 (14%).

## Question 2

Question 2 was answered well, with a mean of 13.7 (68%) and mode of 17 (85%). The question was posed differently to questions covering the same material in the past, but this framing appeared to have caused little difficulty for students. This suggests that this year's cohort of students have an overall understanding of the notion of simulation.

- 2 a) Most students answered this question well. For part (i) a majority provided a witness for the difference between the languages accepted by  $X$  and  $Y$  or an argument based on an attempt to construct a simulation. Part (ii) was also answered well. Common mistakes were to add additional states to the automata (the question asked for additional *transitions*) or just adding one additional transition (two were needed). Part (iii) was then also answered well.

The mean mark for 2 a) was 7.4 out of 10 (74%)

- 2 b) Again, this question was answered well. Marks were generally lost for failing to justify answers. For part (ii) answers should make reference to the inability of a DFA/regular expression to count *arbitrary* numbers of symbols.

The mean mark for 2 b) was 2.9 out of 4 (72%)

- 2 c) Parts (i) and (ii) were answered well. Part (iii) less so. In many cases, the grammar given was still ambiguous, or failed to define the correct language. A significant number of answers approached part (iii) by first providing a DFA, then translating to a grammar (which in general provided a correct answer). Again, this suggests an understanding of the material.

The mean mark for 2 c) was 3.6 out of 6 (60%)

## Section B

### Q3

Question 3 had a mean mark of 10.7 (53%).

### Q4

Question 4 had a mean mark of 14.5 (73%).