

Comments Q1. Algorithm Design.

Almost all students answered this question. The answers were in general of very high standard, with an average near 70% and very few students having poor marks. In each of the three parts there are "naive" algorithms which are straightforward but inefficient in time or space. For these straightforward answers, several marks are lost because of the lack of efficiency. In some cases marks were also lost because of poor algorithm description or explanation, or complexity wrong or poorly explained. In each part, there is a variety of routes to more efficient algorithms and most students attempted these - including sorting and hashing for the first two parts (notice that Quicksort is not a good choice of sorting algorithm for wc complexity). The final part (interchanging two segments of text) could be done by copying (but this is not in-place so doesn't get many marks). In-place solutions were attempted by most students and marks were awarded for good ideas (and often lost because of poor presentation). Overall, a splendid performance - well done!

Q2 This question was a combination of sorting and algorithm complexity. In total 115 students took it. There were some reasonably good answers in the sorting part, but it is a general feeling that the students do not properly understand the complexity bit. This is concerning as in the main exam complexity will play a prominent part. The overall marks were consequently not great, with almost 45% of the students who took the question getting less than 50% mark.

Q3 (Analysis of Algorithms)

93 students took the question.

The mean was 11/20, median was 11/20 and mode was 12/20.

The question was answered well by the great majority of students as this was arguably a more difficult question than in previous years: it tested many of the more subtle aspects of asymptotic analysis, and included a part (d) on amortized analysis for the first time. So students (as a body) have learnt well.

On the other hand, there was a cluster of fail marks, and this may have reflected that the structure of the question was a little different from previous years, and there were slightly fewer marks available for basics. *Very few* (<5) students failed this question if they did Q2 as well, however, and this suggests that some of those who failed this question may have spent too much time on Q1; there were a number of students who seemed to run out of time.

Breakdown:

(a) This tested understanding of big-oh (by the precise definition) and big-theta too. Many students got only partial marks, but in general showed a good understanding.

(b) This tested knowledge of big-oh applied when two variables are involved. Many students got full marks; some got two thirds. Few got less.

© This tested the ability to inspect previously unseen pseudocode (exponentiation-by-squaring code) of a recursive nature and reason about its time and space complexity. Most students were able to work through the recursion correctly, and recognised a logarithmic complexity.

(d) This question probed understanding of basic amortized analysis. Those who attempted it, picked up about half the marks or more, on average. There was some evidence that students may have been running out of time, however, as answers were shorter and somewhat curtailed.
