

## Feedback on the MAS277 exam

Overall performance on this paper was quite good. Some minor upward scaling was applied to the marks.

Here are some detailed comments on the questions.

- Q1. This was generally well done. Not everybody had the definitions in part (i) right, though - it's inexcusable not to! Solutions to (ii)(d) surprisingly often contained nonsense of the form  $(x, y, z)^T = x + 3y + z$ , confusing a vector with a condition it satisfies. And, it was surprisingly common to see attempts to prove closure under addition, say, by example. (Of course, a single counterexample is enough to show something is not a subspace, but to show it is one requires a general argument.)
- Q2. Most parts were done quite well, the exception being (iii), where many people didn't appear to know the definitions of injective or kernel.
- Q3. There were a couple of very common errors here. In (v), most candidates gave the matrix using the correct basis in the source, but the standard basis in the target. (Partial marks were awarded.) And in (vii), many answers showed that the image was contained in the stated set, but didn't consider the reverse inclusion.
- Q4. In part (i)(a) it was surprisingly common not to use the formula given in the course, but instead to calculate directly from the definition of orthogonality. (This is fine, but longer.) Part (i)(c) was not attempted by very many candidates and was often not well done - the definition of distance seemed to be an issue.
- Q5. Again in (i), many people calculated the wrong thing for the distance: what is required is  $\|A - B\|$ .