

When reading these pieces of work and the comments below, please remember that when they were written and marked, the mark scheme and task instructions were slightly different from those in place this year.

- **There is now more focus on the quality of your research question** (refer to the discussion of research questions in the first lecture. If using this year's mark scheme, some of these pieces could be marked down because of their questions. How good do you think the research questions are?
- Conversely, the 'Review' section of the mark scheme was previously a little more strict than it is now. Specifically, evidence of criticality was previously more central to the mark scheme. Note that in the current mark scheme, criticality is still mentioned in the 'Review' section, but only in the higher bands.
- The content of the module has shifted a little since these pieces were written, so Technical Difficulty would be judged slightly differently using today's mark scheme (since marking takes into account whether techniques go beyond the scope of the module).
- **The word and page count are more restrictive this year** than they were previously, so your final projects will be shorter than these. This is partly because of an increase in the importance and weighting of the group presentations.

Other small changes have been made, but these are the most relevant.

The letter grades used below mean the following:

A+	:	$\geq 80\%$
A	:	70% – 80%
B	:	60% – 70%
C	:	50% – 60%
F	:	< 50%

Example 1 (Jordan Agriculture)

A very limited range of sources has been considered and the Introduction contains unsourced assertions (e.g. "one of the fastest growing populations in the world"). However, the work does demonstrate good knowledge and there is evidence of critical thought through identifying a gap in the existing literature. **(Review: C)**

The essay is clear and well-structured, though there are some issues of communication. The constraint values should be sourced (e.g. 481m). It is also confusing to refer to "1989almonds" (when the variable is measured in ha or tons?). Figure 1 is too small and, in general, labelling the lines may have been better than using a colour scale (40 colours!). **(Communication: B)**

The research question is interesting and ambitious and the approach is imaginative and original. With some development and increased sophistication and complexity, it is conceivable that this essay could be developed into a research publication. **(Ambition: A)**

Linear programming has broadly been performed accurately, but the method in Part 2 is dubious. As described, the approach arbitrarily prioritises the least demanded products (which have the highest coefficients). A rethink is required to make this part meaningful. **(Accuracy: B)**

Technically, the work is strong. The use of linear programming is appropriate and the presentation of results is intelligent. **(Technical Difficulty: A)**

Example 2 (UK Trains)

A good range of high quality sources have been considered and good understanding is demonstrated in the introduction. There is some evidence of critical thought, through the brief discussion of the limitation of different indices, though these views are taken from a particular source and more evidence of a critical approach would have been desirable overall. **(Review: B)**

The essay has a fair structure, but it is hampered by a lack of clarity and some missing information. In particular, it is not clear what the variables are that are correlated in Figure 3 and their relationship to track speed limits is not fully explained. Some methods, such as the Dindex plot, are underexplained for the target audience (other students taking the QM module). **(Communication: C)**

The topic is relevant, though the policy implications could be more deeply explored. There is evidence of original thought in how the investigation has been approached. **(Ambition: A)**

Accuracy generally appears to be strong, though it is difficult to judge in some cases given the weaknesses in how the methods have been explained. For similar reasons, understanding has not been fully demonstrated in all cases. **(Accuracy: B)**

Technically, the project combines methods seen in the course - linear regression and clustering - reasonably effectively. It may have been useful to have analysed clusters separately to see whether interesting relationships existed within them. **(Technical Difficulty: B)**

Example 3 (Local Businesses & Population)

This essay includes a well referenced introduction, with a range of high-quality academic studies. There is also some evidence of critical thought, which is used to justify the motivation behind the research itself. **(Review: A)**

The quality of writing in this report is also high. The sections are clear, the ideas are well communicated and the graphs are well laid out and easy to read. There report wasn't flawlessly communicated, however. It was difficult to discern the precise research question, for instance. It would have been useful to see this clearly stated in its own section. **(Communication: A)**

But where this report really falls down is on ambition. Although the research topic is valuable and interesting, and the idea to use employment profile as an area as a metric for gentrification is a clever one, the methods selected to investigate are extremely limited. This is both in the insights they offer and in the technical challenge they present. **(Ambition: F)**

The accuracy of what was included appears relatively high, but a straight-forward clustering procedure , implemented by a pre-written R package, and a basic correlation is a little disappointing for a report that initially seemed to show great promise. **(Accuracy: B ; Technical Difficulty: F)**

Example 4 (Berlin Wages)

A very wide range of sources has been considered. Although evidence of a critical approach could have been more explicit, it is present, through the way the work and its conclusions are placed in the context of the literature. Sources are used well to inform the approach.

(Review: A+)

The essay is very well-structured and the quantitative approaches are well explained. The only possible criticisms are minor. For example, what does the "N/A" section represent in Figure 2? There are also very occasional, minor errors in the text (e.g. misuse of "compiled" in paragraph 1). **(Communication: A+)**

The research question is interesting and ambitious and is handled with thoughtfulness and originality. Despite reservations (below), the work could be claimed to make a genuine contribution to understanding of the subject. **(Ambition: A+)**

Accuracy is high, with certain small issues. While the inclusion of quadratic terms in the regression is well supported, it unfortunately confounds the interpretation of the coefficients. As such, assertions about the effect of increased education in Berlin are not entirely correct (despite the attempt to address this issue through partial differentiation), since the effect varies with the level of experience. **(Accuracy: A+)**

Although the work is basically built around methods seen in the course (multiple regression, hypothesis tests), the careful approach and adaptation of an equation found in the literature mean that the technical level is high overall. **(Technical Difficulty: A+)**

Example 5 (Education preventing crime)

The literature review cites a number of references, but the main findings from the literature are presented in somewhat of a confused way. There is the assumption of a causal link between education and crime, but this is not fully justified by the references, nor it is not exactly clear in which direction the candidate suggests the correlation sits. There are also a number of speculative statements made without reference. For instance, that education makes a more productive economy which reduces crime. **(Review: F)**

There are a number of grammatical issues throughout the report which made it difficult to follow in places. The structure was roughly what would be expected of an academic report, but deviated in places, for instance with two data sections. Many of the figures lacked the appropriate axes labels. **(Communication: C)**

This was an interesting topic, but the research question itself was a little vague. A research question should be answerable within the report so it would have been better to hone in on a more specific definition of what you mean by 'good' and 'prevent' and, for that matter, precisely what you mean by 'education'. **(Ambition: F)**

There are a few issues here. First there are distinct definitions of education that are used interchangeably in the text. For instance: Amount of Education, Performance of students and Quality of Educational Environment are all wholly different factors and appear confused in the text. The correlation matrix was useful, but there was no exploratory analysis of the GCSE data, nor a check for any outliers. The statistical results are screenshotted directly from the software and thus include several irrelevant metrics, such as Durbin-Watson. Aspects of the regression appear to have been handled appropriately, but there are issues with the interpretation of results which thus fail to demonstrate a deeper understanding of the techniques. **(Technical Difficulty: C)**

The project involves linear regression and is thus a relatively straightforward attempt to replicate elements of the course. **(Technical Difficulty: C)**