

How to write a Part III Essay: From Outline to Essay

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- 1 Fundamentals
 - Essay: What is it?
 - Crustacean style
 - Introduction and Conclusion
- 2 Writing process
 - Outline
 - First draft
 - Revision Process
- 3 FAQ

Overview

Main Points

- Transfer of Understanding.
- Own your essay.
- Crustacean style: Structure visible.
- Be ruthless in editing.

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Purpose of Essay

AIM

Transfer of Understanding

If this aim is met, then secondary aims follow.

Not Shakespeare

- No elegant prose required.
- Clear mathematics required.
- Clear explanations required.

Not Research

- Research is hard.
(PhD: 3 years to get one good original idea)
- Writing maths is hard.
- Reading maths is hard.

Use essay to get practice in reading and writing mathematics.
(Some exceptions, e.g. project-, data- or experiment-based essays: Essay setter will tell you.)

Something New

Don't just copy what you've read.

- Your own judgement of what to include, what to leave out.
- Your own overview/structure of the material.
- Your own (selection of) examples.
- Your own connections between results, examples, techniques...
- Your own way of explaining proofs/techniques/experimental results/physical insight.
- Sometimes: your own proof of a known result/interpretation of experiment/heuristic argument...
- Rarely: your own extension of a result/experiment...

Make it your own!

Principle of technical writing

Aim is:

To explain.

- Make it easy for reader to grasp the essentials.
- Sign-post important definitions/results/techniques...

Achieve this through **crustacean style** of writing.

Crustaceans vs Vertebrates

Vertebrates - Skeleton within

- Appropriate for Novels.
- Key pieces of information buried mid-paragraph.
- Construction/plan of plot not visible from outside.

Crustaceans - Skeleton outside

- Use for (front page reporting and) Mathematics.
- Organisation and structure visible at a glance.
- First paragraph shows content of section, etc.
- Important pieces of information highlighted, not buried.

Introduction and Conclusion

These are important!

Introduction

- Advertisement and map.
- Big picture.

Conclusion

- To round off.
- Final insight?
- Tantalising open questions?
- Further directions?
- Short overview/placing in larger context?

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Outline

Recall “How to give a talk”.

- Prepare a Part III Seminar talk on essay.
- One focus for talk.
- Slightly more for essay: two or three connected foci.

Outline: Judgements

- What material to include?
- What order to present things?
- What details to include?
- ...

What material to include?

- Some main core expected by essay setter: talk to them.
- Choose content to make a coherent whole.
- Background (e.g. from lectures) can usually be assumed.
- Don't write a book or PhD thesis!
- Better to explain less material very well than lots of material superficially.

What order to present things?

Difference between educational order and logical order.

Example

Point of essay is Theorem A and Corollary B, which depend on Lemmas 1,2,3 (tedious, not illuminating). Organisation:

- 1 Introduction
- 2 Statement of Lemmas 1,2,3
- 3 Statement and Proof of Theorem A
- 4 Statement and Proof of Corollary B
- 5 Proofs of Lemmas 1,2,3
- 6 ...
- 7 Conclusion

What details to include?

Transfer of understanding!

Pure Maths

- Important proofs need to be there.
- General case needed or only special case?
- Giving main ideas/steps of a proof often shows more understanding than writing out full proof.
- For hard/long proof could explain on example/simple case.
- Full proofs for everything or not: expectations differ. Check with Essay Setter!
- Further developments etc. can be summarised.
- Topic as “tree”: can assume roots and prune branches, but can't remove section of trunk.

What details to include?

Transfer of understanding!

Applied Maths

One view-point:

- Include details of model/experiment/calculation that are essential for interpretation/understanding of scientific conclusions.
- Don't include technical details if not essential for understanding.

Different Essay Setters might have different views, check!

What details to include?

Theoretical Physics

One view-point:

- Give evidence that you've done the calculations yourself.
- Make clear you are a mathematician who understands what's going on rather than a (very intelligent) lawyer who has reviewed and paraphrased some maths papers.

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First draft

Typesetting vs handwriting

- For first draft, use pen(cil) and paper!
- Why?
 - Concentrate on mathematics, not layout.
 - Concentrate on global shape of essay, not local.
 - “Word processing encourages prolixity, repetition and slack construction.”
- Don't spend time on typesetting equations, diagrams, ...
- Write first draft quickly.
- Don't refer to papers/books at this stage.

Revision process

Separate writing and editing/revision process!

- Print out double spaced.
- Put on “editor hat” and be ruthless.
- Repeat several times.
- Penultimate draft: give to essay setter.
- Write Acknowledgements after this.

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- REVISION mostly is:
 - changing punctuation,
 - changing word here and there,
 - inserting extra step in an argument,
 - ...

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 - Piecemeal revision likely to produce inconsistencies.
- Alternative to revision and rewriting: OMISSION.
 - If it doesn't fit even after rewriting: leave out.
 - Hard to do, but sometimes necessary.

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Essay setter

? When should I talk to/contact my essay setter?

- (When you decided to do the essay.)
- When you have an outline.
- When you have penultimate draft.

Essay content

- ? How can I compress the contents of three books/papers into 8000 words?
 - Don't try! (That is part of the challenge.)

Collaboration

- ? May I talk to research students while I'm learning the material?
 - Yes, BUT: acknowledge students by name.
- ? May I talk to other Part III students while I'm learning the material?
 - Yes, BUT: acknowledge students by name.
- ? May I compare notes/get help while writing the essay?
 - No. (Stop collaborating at First Draft.)

Faculty plagiarism guidelines

Writing resources

? Are there any other resources about writing?

- Marj Batchelor “Get Writing”
- Tom Körner “How to write a Part III Essay”
- Strunk and White, The Elements of Style. (Moore Library, PE1408 .S77 2000)

Summary

Main Points

- Transfer of Understanding.
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Go and write good essays!

