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

Julia Goedecke

Graduate Education Officer, DPMMS

3 February 2016, Wednesday Part III talks
1 Fundamentals
  - Essay: What is it?
  - Crustacean style
  - Introduction and Conclusion

2 Writing process
  - Outline
  - First draft
  - Revision Process

3 FAQ
Main Points

- Transfer of Understanding.
- Own your essay.
- Crustacean style: Structure visible.
- Be ruthless in editing.
1. Fundamentals
   - Essay: What is it?
   - Crustacean style
   - Introduction and Conclusion

2. Writing process
   - Outline
   - First draft
   - Revision Process

3. FAQ
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?
1 Fundamentals
- Essay: What is it?
- Crustacean style
- Introduction and Conclusion

2 Writing process
- Outline
- First draft
- Revision Process

3 FAQ
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?
- ...

Julia Goedecke (DPMMS)
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
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.

Transfer of understanding!
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!
Theoretical Physics

One viewpoint:

- 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.

Different Essay Setters might have different views, check!
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.
Revise or Rewrite

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

• More serious changes needed: REWRITE passage.
  Will flow better than hacked about original.

• 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.
Revise or Rewrite

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

- **More serious changes needed:** REWRITE passage.
  - Will flow better than hacked about original.
  - Piecemeal revision likely to produce inconsistencies.
Revise or Rewrite

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

- More serious changes needed: REWRITE passage.
  - Will flow better than hacked about original.
  - 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.
1 Fundamentals
   • Essay: What is it?
   • Crustacean style
   • Introduction and Conclusion

2 Writing process
   • Outline
   • First draft
   • Revision Process

3 FAQ
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.
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
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)
Main Points

- Transfer of Understanding.
- Own your essay.
- Crustacean style: Structure visible.
- Be ruthless in editing.
Go and write good essays!