

RESEARCH PROJECT

WESLEY CALVERT

1. WHAT IS TO BE DONE

You will choose some recent (since 1992) paper either in the area of algebra or making significant use of the theory of groups or rings, from a high-level scholarly journal in mathematics (list attached). The article must be agreeable both to you and to me. You will read the paper (where “read” is taken in the mathematical sense, more about understanding than about linear progress through a document), perhaps (at your discretion) think about it a little beyond what you’ve read, and organize what you’ve learned in such a form as to present it to the rest of the class. You will give a ten minute oral presentation to the class on November 30, December 3, or December 5.

2. PROJECT TOPICS

You have broad latitude in selecting your topic. The list of “high-level” journals below is extensive, and nearly every significant advance in mathematics is mentioned in at least one of them at some point. Your presentation need not be bound exactly to a presentation of the results of the paper, but should be heavily influenced by them. Think big. Recall that the ambitious nature of the project is part of the grading rubric (below).

You should meet with me to obtain my approval on your project topic. Nearly any reasonable idea will be approved. I can help you locate resources that may be helpful to you. Talking with me about your project, how it’s going, and what you wish you could find for it is a good idea.

Be adventuresome, where possible, in your choice of topics and opinions. I’d dearly love to learn something I don’t already know. Some papers will be more demanding than others, but the grade has some built-in factors to reward those who take risks by stretching their abilities.

3. HINTS ON THE PRESENTATION

Use standard grammar, etc. (unless you have good reason not to — Andrea Dworkin would fail most state high school writing assessments). Give the presentation some structure. It should not only have an enlightening introduction and conclusion, but should move smoothly from one place to another in between.

I still believe in the advice of Strunk and White (*Elements of Style*, 4ed):

Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make

all sentences short, or avoid all detail and treat subjects only in outline, but that every word tell.

Your presentation should be professional in tone. The active voice is usually preferred over the passive, but good expression is paramount. For instance, I could not figure out an equally honest and expressive way to write the last sentence in the active voice. It is also sometimes tempting to think that formal, literate language means using fancy words. Here, the advice of Strunk and White helps again: “Avoid the elaborate, the pretentious, the coy, and the cute. Do not be tempted by a twenty-dollar word when there is a ten-center handy, ready, and able.” While over-used, under-specific words are generally less desirable, one distinguishing mark I have seen in the best-educated people I know is that they can, when they wish, talk more plainly than anyone else.

Be judicious in your use of sources. With rare exceptions, sources have authors (and no, “http://www.wwwww.ww...” is not an author), who have (one hopes) qualifications. In your use of the material you should take account of any relevant qualifications the author has — not so that you can be obsequious, but so that you can know if the author is a hack. In particular, be careful of internet sources. In print, reputable publishers serve (often) as an effective screen to guarantee a certain level of, if not authority, at least worthiness to be considered in learned discussion. Any fool can write a web page, blog, or Wikipedia entry, and can publish it straight to your computer without any such vetting. Let the reader beware — and all the more, let the *speakers* beware who give their own voice to another’s ideas. Make sure the ideas are worthy of your voice.

Be aware of your obligation as a scholar (not to mention the course and university academic honesty policies) to give proper credit for everything. If a wording, or even an idea, doesn’t come from you, you should be sure to give proper credit for it. Rewording a sentence that you took from a book isn’t enough to make it your own. I shouldn’t have to say anything about borrowing the wording directly without credit.

YOU MUST PRACTICE YOUR PRESENTATION!!! The ten-minute talk is the hardest format in mathematical communication, and is also one of the most common. You must practice, and you should practice many times. You should practice with a stopwatch and in a classroom. You should, if possible, practice with an audience (I know one successful mathematician who used her cat as a practice audience, but she knew she needed something). Last winter I evaluated a speaker (outside the university, by the way) who received failing marks, primarily because he had never practiced his presentation.

4. TIMELINE

September 28: You must have met with me and had a topic approved

November 19: You must provide me with a copy of the paper on which you will base your presentation. No significant changes of topic should be made after this point.

November 30–December 5: In-class presentations

Of course, these are only the times at which *I* need to see things. If you go out on September 27 to pick a topic, you won’t find one in time, and if you start your reading on November 20, you won’t understand enough in time to make your presentation. The level of reading I’m asking you to do will take *enormous* amounts

of time. You must behave as if you were driving in snowy weather: *Start early, and expect delays.*

5. GRADING

I will grade your project by making notes during your presentation on the following issues:

- (1) Content Questions
 - (a) Is the mathematical content correct?
 - (b) Do the explanations make sense? Do they show understanding of the work and of the literature cited?
 - (c) Is the topic approved and the connection to algebra clear? Is the topic essentially unchanged from the topic communicated on November 19? Is the topic closely connected to some paper since 1992 in one of the indicated journals?
 - (d) Is the project ambitious? Is it original? Does the author show interest?
- (2) Form Questions
 - (a) Are any sources authoritative and properly cited? Is some effort made, where appropriate, to assess their credibility and describe it in the presentation?
 - (b) Does the report exhibit a clear structure? Does it restate the facts sufficiently to be self-contained (understandable by someone who has read none of the background material)? Is appropriate use made of time (there is enough to be worth ten minutes of people's time, without overloading the presentation or going over the time limit)?
 - (c) Is the presentation well-delivered and professional? Are the tone and language appropriate to the audience and occasion?

For the ideal project, I will be able to answer all of these questions with a resounding yes. If any of the answers are no, the grade will be adjusted downward according to the severity of the problem. The content questions will count for 80% of the grade, and the form questions will count for 20%.

APPENDIX A. INCLUDED JOURNALS

- (1) The Journal of the American Mathematical Society
- (2) Acta Mathematica
- (3) Annals of Mathematics
- (4) Communications in Pure and Applied Mathematics
- (5) Inventiones Mathematicae
- (6) Bulletin of the American Mathematical Society
- (7) Publications Mathematiques de l'IHES
- (8) Duke Mathematical Journal
- (9) Annales Scientifiques de l'Ecole Normale Superieure
- (10) Journal of the European Mathematical Society
- (11) Proceedings of the London Mathematical Society
- (12) Mathematische Annalen
- (13) Journal de Mathematiques Pures et Appliquees
- (14) Compositio Mathematica
- (15) Advances in Mathematics
- (16) Transactions of the American Mathematical Society
- (17) American Journal of Mathematics
- (18) Journal für die Reine und Angewandte Mathematik
- (19) Journal of the Institute of Mathematics of Jussieu
- (20) Michigan Mathematical Journal
- (21) Journal of Algebraic Geometry
- (22) Expositiones Mathematicae
- (23) Journal of Combinatorial Theory, Series B
- (24) Commentarii Mathematici Helvetici