

RESEARCH PROJECT

WESLEY CALVERT

1. WHAT IS TO BE DONE

You will choose some paper published in a journal indexed by either MathSciNet or ISI, either in linear algebra or focusing on some application of linear algebra. The paper 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 during the period of April 23 to May 2.

2. PROJECT TOPICS

You have broad latitude in selecting your topic. Think big. Recall that the ambitious nature of the project is part of the grading rubric (below).

Some ideas on where to get started looking for a subject:

- *The Bulletin of the American Mathematical Society* or *The Notices of the American Mathematical Society*
- Other journals
- Books, either in Morris Library or in the Math Library in Neckers
- A colloquium or seminar talk you find interesting
- Background work for a thesis you’d like to write
- Web pages of mathematicians, where preprints of recent work are often posted
- ArXiv
- ...

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, and is required at two points (see below).

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. THE THREE POINT MEETING

You must schedule a meeting with me on or before March 9. At this meeting, you must show me three things:

- (1) A draft outline of your presentation

- (2) A brief (less than thirty seconds at conversational pace) description of why the project is interesting
- (3) A statement of the two points you anticipate being difficult in the rest of your preparation.

4. 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). A few years ago, I evaluated a speaker (outside the university, by the way) who received failing marks, primarily because he had never practiced his presentation.

5. TIMELINE

February 16: You must have met with me and had a topic approved

March 9: Your Three Point Meeting must have occurred by this date.

April 23–May 2: In-class presentations

Of course, these are only the times at which *I* need to see things. If you go out on Valentine's Day to pick a topic, you won't find one in time; if you start your reading on March 8, you won't be able to say anything substantive at a Three Point meeting the next day; and if your presentation isn't pretty nearly finished by mid-April, you're inviting disaster upon yourself. 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.*

Moreover, note that there are eighteen people in the class. I will not be able to take that many meetings on a single day. I will schedule meetings as they are requested. While I will make an effort to find an available time, the responsibility for scheduling your topic meeting and your Three Point meeting before the deadline is yours.

6. 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 linear algebra clear? Is the topic carefully connected to some scholarly community of thought in mathematics?
 - (d) Was the material presented at the Three Point meeting satisfactory? Did it meet the deadline?
 - (e) 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%.