

MATH 232: Project Instructions

One key reason why linear algebra is so important is that it has applications in so many other disciplines. In this paper, you will be responsible for writing a paper in groups that explores applications of linear algebra, either to other fields of math or to other subjects. Your paper must satisfy the following requirements:

1. You must write your paper in a group of size 2-3 students from the class.
2. Your paper must be at least 5 pages long single-spaced with 12-point font and 1 inch margins.
3. Your paper must be typed. I recommend the use of \LaTeX to type your paper, as this is the most commonly used typesetting program in mathematics. However, you are welcome to use any typesetting program you wish for this project, including Microsoft Word.
4. While I will not give you a strict format to follow for your paper, you must break your paper up into distinct sections, each with their own title. Three of these sections must include Introduction, Conclusion, and References. You must also include a title page with your paper's title and a list of everyone who is in the group.
5. Your paper must cite at least five different references.
6. The audience for your paper should be your classmates; thus, if you are writing a paper for instance about the applications of linear algebra to a branch of economics, no economics background should be necessary for reading your paper. You may assume prior knowledge of any topics we have discussed in class or from assignments/exams.
7. The main topic of your paper must not be any topic that we are discussing in class this semester. While these may not be the main focus of your paper, if your topic makes use of any of these, that is perfectly fine; for instance, a paper discussing the use of eigenvectors in music composition is perfectly fine, while a paper centered solely around definitions of and mathematical applications of eigenvectors is not. If you are not sure if your topic is appropriate, I encourage you to ask me before submitting your proposal. Here are topics that may *not* be the sole focus of your paper:
 - Any topics discussed in class thus far
 - Inner product spaces
 - Matrix rank/dimension/bases
 - Linear transformations
 - Eigenvalues/eigenvectors
 - Magic squares (we will not be discussing this one in class, but it will be the topic of a sample paper I **may** write for you if I have time)
8. Keep in mind that while this project may only be worth 10% of your overall grade in this course, I encourage you to take it seriously; developing the ability to communicate mathematics and by writing in general is a very important skill, one that will serve you well in future courses as well as in your career.

Calendar:

- Project proposal – due Wednesday, 11/8 in class (submit paper version)
- First draft – due **Monday, 11/20** by class time (must be submitted by e-mail as PDF attachment AND editable version to Kevin)
- Peer reviews – due **Wednesday, 11/29** by class time (must be submitted by e-mail to Kevin)
- Final paper – due Wednesday, 12/6 in class (must be submitted by e-mail as PDF attachment AND editable version to Kevin)

Project proposal: due Wednesday, 11/8 in class

- Must be 1-2 pages long and typed
- Must give a description of the problem, including a description of its applications to linear algebra
- Must cite at least two sources
- Must list all team names and give a (tentative) title for your paper
- If you are struggling to come up with an appropriate topic, I encourage you to come meet with me as a group. While I am by no means an expert, I would be happy to help you find suitable topics. If your paper is exploring applications of linear algebra outside of mathematics, I encourage you to talk to other professors who may be more knowledgeable than me.

First draft: due **Monday, 11/20** by class time

- Must be in finished form – this should appear in the same format as your final version, and so it should appear complete, meaning eg: there should not be any points in your paper that read [INSERT GRAPH HERE] or [FIX THIS UP LATER]
- This first draft will only be graded for professionalism and timely completion, ie: it will receive full points as long as it appears as a formal, complete document satisfying all requirements from the previous page.
- Keep in mind that this draft will be graded by peer graders. Thus, it should be accessible to anyone else from the class, not just to other students with similar interests to yours.
- Make sure *all* group members' names are on the assignment. Only one member of each groups needs to submit the files.
- You must submit two files with your assignment, both as e-mail attachments to kgerstle@oberlin.edu.

- A PDF of your finished document
- An editable version of your work. For instance, if you are typing your paper in \LaTeX , you should include a copy of the .tex file. If you are typing in Word, you should include a copy of the standard document.

Peer review: due **Wednesday, 11/29** by class time

- Your group will give feedback on the first drafts for *two* of the other groups in the class.
- I will give each of you a sheet with instructions on how to review.
- You should submit your reviews as two separate documents, both as e-mail attachments to `kgerstle@oberlin.edu`.

Final paper: due Wednesday, 12/6 by class time

- This is the final version of your paper that will make up the bulk of your grade on this project. This will be graded both for professional appearance and for mathematical content.
- As with the first draft, you must submit both a PDF version and an editable version of your paper by e-mail to `kgerstle@oberlin.edu`. Only one member of each group need submit their paper.

RUBRIC:

Proposal: (10 points)

- Does your proposal contain all necessary information, including at least two references?
- Is your proposal one to two pages long?
- Is it clear from your proposal what your topic is and how you will be discussing linear algebra in your topic?

First draft: (10 points)

- Does your paper appear to be in completed form, including a title page and Introduction, Conclusion, and References sections?
- Is your paper at least five pages long and generally professional in nature?
- Is your paper accessible to someone who knows the basics of linear algebra but does not necessarily know anything else about your topic?

Peer review: (10 points)

- Did you submit feedback for both of your assigned papers in a timely fashion?
- Did you fill out the feedback forms completely?

FINAL DRAFT:

Title and Introduction: (10 points)

- Does your title page include names from everyone in your group and the paper's title?
- Does your introduction clearly and concisely describe your topic as well as give a brief description of how it relates to linear algebra?

Body: (30 points)

- Is there a logical development of concepts?
- Does the paper contain all necessary definitions?
- Does the paper divide up the main body of the paper into appropriate organized sections?
- Does the paper give examples to illustrate key concepts when appropriate?

- Is all information correct (to the extent of Kevin's knowledge – be careful, he may know more than you think...)?
- Is the paper accessible to all other students in the class (as well as to Kevin – be careful, he may know less than you think...)?
- Does the paper give evidence that you really understood your topic?

Conclusion: (10 points)

- Did you sum up the results from your paper in a concise manner?
- Is it clear from your conclusion the impact of your topic in its field? (Note: I will not be grading this based on whether or not I personally found the topic to be of value, but rather, did you give a sense of how it fits in to the larger field?)

References: (10 points)

- Did you cite sources as necessary in your paper?
- Is your citation format correct/internally consistent?
- Did you have at least five references?
- Were your references sufficiently professional in nature?

Style: (10 points)

- Did you follow the margin, font, page, and page specifications? (at least 5 pages, single-spaced, 12-point font, 1 inch margins)
- Is the paper generally free of spelling and grammatical errors?
- Are there smooth transitions between sections?