

MATH 240

Fall 2021

Why study linear algebra? We've given a very basic answer to this in terms of systems of equations; now it's time to explore this with some applications.

You and your group will explore a topic. I've chosen the topics, although if your group has something specific in mind, you may request an opportunity to pitch that idea to me. If it isn't a topic being explored by another group, and I think you'll be able to find suitable resources, I'll likely say yes.

To help begin your exploration, you may receive a source or two from me about the topic. This is in no way an exhaustive resource, but it is an attempt to provide you with a useful point of entry if needed.

Your exploration will culminate in a class presentation and a paper. **You'll make the presentation in class during Week 10, and you'll submit the paper in class on Wednesday of Week 10, no matter what day you present your work.** Please note that each group is submitting a single paper and making a single presentation. Each member of the group will receive the same grade (although I reserve the right to alter an individual grade in extreme circumstances), and the quality of both the presentation and the paper will determine that grade. I suggest that each group make sure that each member be familiar with all the material in both the presentation and the paper, as a question about your topic may arise in your final exam. However, for the final products, it is fine if some of you concentrate on the writing of the paper, and others on the production of the presentation; everyone's names should be on both pieces.

While both the paper and the presentation should communicate what you've learned about the topic, what makes for good communication is different for each medium. Your paper should not just be the slides pasted together. Consider the difference between putting together a you-tube video and a research paper. Generally, during a presentation, you rely on spoken words and on gestures to communicate some ideas to your audience and to make the ideas flow. In a paper, however, these need to be written in explicitly. For both, **your grade will depend on how well you communicate and on having correct mathematics.**

Your presentations should be 25-30 minutes in length. Practice them. They should be clear and make good use of the blackboard or overheads/slides. They should make sense to your fellow classmates who have not read what you've read. They should use the limited time you have wisely. In particular, the class should be able to walk away with a few clear ideas and examples about your application from your presentation. If I asked them to, they should be able to write me some coherent sentences on what you presented and define the main terms you used.

The paper should be well written. Being well written includes using complete sentences and using notation that has been defined. For example, if you talk about A , then somewhere earlier you should have told me that A is an $m \times n$ matrix or...whatever it is. Being well written includes using consistent voice and subject-verb agreement. Being well written includes clearly introducing your subject matter and making the subject matter flow throughout the paper as well as concluding the paper. This is

particularly challenging for a paper written by several people; be sure to allow enough time to carefully proofread your work. Did I mention that being well written includes using complete sentences and using notation that has been defined?

This work is a research paper. As such, you are expected to consult outside sources and also to cite those sources. The style of citation is not at issue here (APA, MLA....use your favorite style); what is important is that you provide a bibliography and that throughout the project, you provide citations when necessary. When is a citation necessary? Obviously, when you quote a source, you should cite it. Take special care not to paraphrase too closely. You may not have simply copied the words exactly, but if you changed the word “since” to “because”, or put the latter part of a sentence first instead, well, that is not your own work. Either cite it, or rewrite it. Definitions in mathematics are like dictionary definitions though, and you may use them without citation. Theorems should be stated exactly (using the notation you’ve established), and in this paper, you should include a reference for any theorems *not* in our textbook which you use. If you are using an idea from one source, cite it. If you use an example which you see in one source, cite it. Note that there isn’t much reason to use exactly the same example you see in a source: make the material your own. These guidelines are for your class presentation too. Neglecting to give credit where credit is due will adversely affect your grade.

Two notes deserve special mention. 1) mathematical expressions in the paper can be written in by hand, but the rest of the paper must be typed 2) you may assume familiarity with all terms that have been used in our class; in particular, you do not need to cite any definitions or theorems from our text which you use.

Finally, you may be wondering how long your paper should be. The good news is that there is no specific length! The bad news is, because there is no specific length, you cannot escape that the main point of this paper (and any paper) is to communicate ideas well. That said, it is true that this project is a major component of this class and there are four of you working to complete it. Thus, if your paper is 3 pages, you have not fulfilled the assignment very thoroughly, and if your paper is 20 pages, you have likely beaten your reader to death with redundancy. So, aim for 5-10 pages.

One final note: everyone is expected to be in class and giving full attention to all the presentations.