Instructions/Information. The purpose of this sheet is to communicate your intentions for the term/team ("tearm"?) project. As you are no doubt aware, there are many different vehicles for communicating your knowledge and demonstrating your skills. Your instructor wants to offer flexibility in this regard while also providing an opportunity for you to challenge yourself and learn something significant about linear algebra. Please complete this worksheet and submit it no later than Wednesday October 12. The term/team project is worth 15% of your grade in this course.

1. Mark your choice below by marking the corresponding box with an ‘X’.

☐ Survey a Research Area. A survey paper is an essay which explains the state of the art in a particular academic discipline. In researching a topic, you must draw on multiple sources. It’s probably too much to expect one to read all the most recent research on a particular topic, but it is probably possible to comprehend a reasonable cross section of ideas. In surveying a mathematical topic, you will have to explain some history of the ideas and the most significant results (especially theorems and/or algorithms). The result of your efforts should result in a paper of about 10 pages in length. Read below for a list of suggested topics.

☐ Summarize a Research Article. If you are already doing some research in an area that involves linear algebra extensively, then you may already know of one or two key research articles that you find useful. Summarize the article and explain how it may have implications for your work. A summary should include plentiful applications and/or examples of the results in the article(s). A summary should also thoroughly explain the background of the research, especially its historical motivation.

☐ Give a Talk. Instead of writing a survey article or summary, you may elect to instead give a talk to your colleagues during class. Your talk will be scheduled during the last few weeks of classes, probably November 28, November 30, December 5 or December 7. It is reasonable to expect that your talk may last an entire class period. (Time flies!) Before your talk, you are required to discuss an outline of your talk with your instructor. See below for a list of suggested topics.

☐ Computational Project. Carl Meyer’s text is focused on algorithms for computation, especially numerical linear algebra. Thus, this option would mean that you would write some code which implements some of these algorithm and demonstrates some of these ideas. Naturally, in writing code, you must also provide human-readable documentation explaining your code. Provide comments below about what system or language you wish to use.

☐ Solve Advanced Exercises. Advanced exercises abound throughout Carl Meyer’s text. This option requires that you submit solutions to a selection of these exercises. Depending on the length or difficulty of the exercises, this would probably be about 5-10 exercises. You are required to agree on a set of problems with your instructor.
The following are examples of problems that one might work on. 3.7.11, 3.8.8, 3.10.4, 3.10.7, 4.4.20, 4.5.11, 4.5.15, 4.5.17, 4.5.20, 6.2.24, 7.9.23. Ideally, the exercises should follow a common theme, but this is not required.

☐ Hybrid or other Presentation. If you have some other idea about how to demonstrate what you are learning, check this box, explain below, and discuss your ideas with your instructor. Do you want to do a poster or a video or a mixed-media presentation? Perhaps some aspect of linear algebra has already inspired you to write and perform a short skit (not encouraged).

General Questions for Exposition. If you are writing an expository paper or giving an expository talk, then you should try to remember that your audience consists mainly of college students at about your level. Generally, you should be prepared to address some questions: Why is this subject interesting? What are the main ideas and how do they fit together? What is the history of this body of ideas? Can you give examples of the ideas or results in this theory?

Topics. Here are some suggestions for topics. If you are presenting a survey paper or a talk, then you are urged to choose a topic among those listed here: Coding theory, Euclidean lattices, matroid theory, rigidity theory, electrical circuits, distance regular graphs, Markov chains, Perron-Frobenius theorem, eigenvalues of graphs, linear difference equations, Krylov methods, classical matrix groups, the simplex algorithm (linear programming), solutions to linear PDE’s, Fourier series, signal processing, Hilbert spaces, flows in networks, Bruhat, Iwasawa, and other decompositions of matrix groups. If you have other ideas for topics, then you should mention them below and/or discuss them with your instructor.

2. Provide comments that you have about your proposed project. If you are working on a project as part of a team, this is a good place to mention this. (A team may have no more than 3 students. You may submit your worksheet as a team.)