I write as a 35-year veteran teacher of mathematics and statistics, at Mount Holyoke College. This semester I am teaching two sections of linear algebra, from Gilbert Strang's Introduction to Linear Algebra, 4th edition. I understand that I'm one of the first, perhaps the very first, to teach from this edition, scooping even the author himself, whose spring semester at MIT began a week after Mount Holyoke's.

In choosing a book for my course, I reviewed more than a dozen choices. In what follows, I'll try to set out why, looking back on the first two-thirds of the semester, I'm firmly convinced that I chose the right book to teach from. But first, here's an excerpt from an e-mail I sent the author a few weeks ago:

> I've admired your book ever since the first edition came out, but in our department we have to wait in line to teach linear algebra, and this is my first chance to teach from your book. It's hard to put into words how much I'm enjoying it.
>
> In 35 years, I've nearly always ended up feeling deeply disappointed with almost any textbook I've tried to teach from. However, I've had the good fortune to find two books I really admire. Yours is one of those two inspiring books. Thanks to you, I'm having a blast!

Enthusiasm aside, I'll start the substance of my review with four questions, aimed both at students and at teachers. These questions highlight the features I find inspiring – but they are not merely rhetorical: I've tried to formulate questions that should be helpful to anyone trying to decide whether Strang's Introduction to Linear Algebra is the right choice for them. In each instance, although my own answer is a resounding "Yes to choice one!" I can imagine teachers and readers whose preference would go the other way.

- Do you want a book that puts a top priority on the substantive content of linear algebra as a subject in its own right, or a book that uses linear algebra as vehicle for teaching formal proofs?

- Do you want a book whose exercises are imaginative, minimize unnecessary computation, challenge the reader to think about core concepts, and anticipate the content to come, or do you want exercises that closely track the pattern of worked examples du jour, with multiple instances of each type?

- Do you want a book that works hard and thoughtfully to communicate the ideas that unite linear algebra, or do you want a book that has thinned and linearized the content in order to make teaching and learning go more smoothly?

- Do you want a book written by a mathematician with a lifetime experience using linear algebra to understand important, authentic, applied problems, a former president of the Society for Industrial and Applied Mathematics, or do you want a book shaped mainly by the esthetics of

pure mathematicians with only a weak, theoretical connection to how linear algebra is used in the natural and social sciences?

To get more technical:

The order of topics in a linear algebra course is often a good indicator of the author's orientation. If linear algebra is trotted out mainly as a show horse, a way to exhibit the sleek beauty of well-groomed mathematics, you won't find the singular value decomposition (SVD) in the index. Dot products, projections, and (horrors!) least squares will come late in the book. Abstract vector spaces, properties of linear transformations, change of basis, and isomorphisms of n-spaces will be prominent. Alternatively, if linear algebra is recognized and harnessed as a powerful draft horse – and we know from the Budweiser Clydesdales that horses doing real work can compel esthetic admiration – we should expect least squares early, and expect attention to the SVD, as in Strang's book. Strang calls the SVD "a highlight of linear algebra"., and it is. A best-selling competitor doesn't even list the SVD in its index.

Finally, you can a thinned version of linear algebra from the real thing by the attention to the duality between algebra and geometry. Intellectually thinner books spend more time on algorithmically-based arithmetic and algebra. These algorithmically oriented books are mere cognitive comb-overs. The more substantial books work systematically to develop in parallel the reader's algebraic skills and geometric intuition. The contrast stands out in sharpest relief when it comes to eigen-stuff. The deep books, like Strang's, emphasize geometry: does multiplication by A change the direction of x? The comb-overs emphasize Cayley-Hamilton and computation.

In conclusion, I'll borrow from the opening lines of Anna Karenina: Traditional linear algebra books are all alike. Each profound linear algebra book is profound in its own way. At the advanced level, we have a handful of profound linear algebra books, but at this point, at the introductory level, I know of only one: Gilbert Strang's Introduction to Linear Algebra.

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