

**GILBERT**

Well, I'm Gil Strang. And I'm very happy if you know the linear algebra videos on

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OpenCourseWare or on YouTube. That's for the math course 18.06. And I'm even happier if you like them. And I'm here today to update them for several reasons.

Well, a lot happened in linear algebra in these years. Fortunately, the whole subject has just become more and more essential, more and more important, more and more beautiful. And so I wanted to say something about those later steps.

And also, when I teach it now, I have a new starting point. And I'll show you that. So I'll go a little slowly on that starting point. The slides tell you the whole course. And that's crazy to have a full course within a short video. But especially the first part is new.

And I'm even writing a textbook called *Linear Algebra for Everyone* that will start this way. I hope that the new start brings in real linear algebra ideas right away. And let me show you where those are.

So this is an outline of the whole video. And the first line, which I think about in my mind as matrix  $A$ , is a product of a  $C$  matrix, a column matrix, and a row matrix  $R$ . And you'll see what those are. So that's the new idea. That will come first.

Then these are five famous essential shorthand descriptions of the key chapters of linear algebra, the key chapters. So they represent, for example, LU is those letters are famous. And computer commands would be exactly those letters LU for elimination for solving equations, the first job of linear algebra.

And then QR. So  $Q$  is a very interesting important type of matrix. That's standing for an orthogonal matrix. There is the word orthogonal or perpendicular. So those are the best matrices to compute with. And that QR gets us there.

And  $S$  is for a symmetric matrix. And it will involve-- oh, well, I should say, the first half, ending with there, with QR, is about solving equations. The second half, these three are about eigenvalues and eigenvectors and singular values, a different way to approach the whole subject and a very, very important way.

Among my goals is to help courses around the world get singular values included because you really don't want to miss them. That's the high point of the theory. And it's expressed like all

the others as breaking a matrix into two or three pieces, two or three parts. So that's my plan for this video. And I hope it's helpful. Again, it's a whole course in a short time. And please go to the real 18.06 videos for the details. Thanks