The exam will be Wednesday October 1, 9:15-10:15. No books, notes, calculator, electronics, or internet access.

It will cover Chapters 1 and 2.

Chapter 1: Introduction to Vectors
Section 1.1: Vectors and Linear Combinations
terminology/definitions: vector, linear combinations of vectors, vector addition, scalar multiplication, a vector equation.
skills: how to draw vector addition, subtraction, scalar multiplication, and linear combinations

Section 1.2: Lengths and Dot Products
terminology/definitions: the dot product of two vectors, the length of a vector, a unit vector, the angle between two vectors
skills: how to use the dot product to determine the angle between two vectors (or whether they are orthogonal, acute, obtuse); how to find a unit vector in the same direction as a given vector, how to find the length of a vector.

Section 1.3: Matrices
terminology/definitions: matrices, matrix - vector product (both a row-view and a column-view), matrix-vector equations (both a row-view and a column-view), a first look at the idea of a matrix inverse, a first look at the idea of a set of vectors being linearly independent or dependent.
skills: how to determine if one vector is a linear combination of others, how to solve systems of equations (in an ad hoc manner, perhaps), to recognize when a system of equations has one solution or multiple solutions or no solution.

Chapter 2: Solving Linear Equations
Section 2.1: Vectors and Linear Equations
terminology/definitions: The column and row pictures of $A\mathbf{x} = \mathbf{b}$ both algebraically and geometrically, in 2- and 3-dimensions, the identity matrix, a first look at matrix multiplication.
skills: Understand the geometric and numerical consequences when solving $A\mathbf{x} = \mathbf{b}$ and $\mathbf{b} = 0$, understand the geometric and numerical interpretations of solutions to $A\mathbf{x} = \mathbf{b}$

Section 2.2: The Idea of Elimination
terminology/definitions: elimination, multiplier (ex: $\ell_{31}$), elimination matrix, pivot,
skills: Know how to use elimination, including elimination matrices, to transform the matrix $A$ or the system of equations $A\mathbf{x} = \mathbf{b}$ into upper triangular form, recognize when the process of elimination breaks down.

Section 2.3: Elimination Using Matrices
terminology/definitions: the formal (rigid) algorithm for elimination, augmented matrix, row exchanges and corresponding matrices, formal matrix multiplication and its algebra
skills: Perform elimination in this formal sense. Be able to find the corresponding elimination matrices and the single matrix that performs all steps simultaneously.

Section 2.4: Rules for Matrix Operation

terminology/definitions/rules: there are several rules about how matrix multiplication does and does not behave (ex: it's associative and it distributes through addition, but it's not necessarily commutative), block multiplication
skills: This was a deep dive into matrix multiplication. You should be able to multiply matrices using any of the four approaches.

Section 2.5: Inverse Matrices
terminology/definitions/rules: the inverse of a matrix, algebra of inverses (ex $(AB)^{-1} =$??)
skills: Gauss-Jordan Elimination to find the inverse of a matrix A. How the inverse relates to solutions to systems of equations.

Section 2.6: Elimination $=$ Factorization: $A = LU$
terminology/definitions: $LU$-factorization
skills: How to find an $LU$-factorization for a matrix $A$ or recognize that no such factorization exists, How this factorization relates to elimination. How the $L$ and $U$ matrices can be used to solve $A\mathbf{x} = \mathbf{b}$.

Section 2.7: Transposes and Permutations
terminology/definitions: the transpose of a matrix, transpose algebra, symmetric matrices, permutation matrices