Watched 1-8, 14, 15, 16, 21

http://ocw.mit.edu/18-06S05

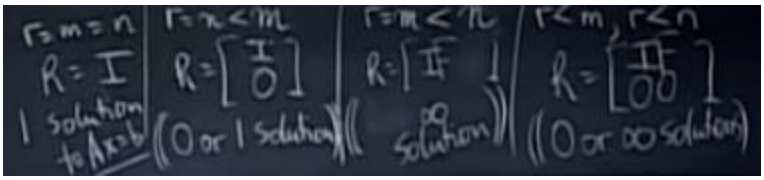
- Intersection of two subspaces is another subspace.
- Ax = b can be solved only when b is a vector in the column space.
- Rank of matrix is less than the number of rows and the number of columns.
- To identify, if a set of vectors is a subspace, it only needs to be verified if a 0 vector is present. In other words, only if the geometric representation passes through the origin, the system is a subspace.
- Suppose the system has a particular solution x_p; given its null space is x_n, all solutions are given by x_p + x_n. If the the system has no null-space (full rank), then the solution of the system is the particular solution.

For an m x n matrix, when rank = m = n, the reduced row echelon form is the Identity matrix. There is 1 solution.

For an m x n matrix, when rank = n < m, the reduced row echelon form has the Identity matrix in the top and zero rows below. There are 0 or 1 solution.

For an m x n matrix, when rank = n < m, the reduced row echelon form has the Identity matrix on the left side and free variables on the right side. There are infinite solutions

For an m x n matrix, when rank < n and rank < m, the reduced row echelon form has the Identity matrix on the left side, free variables on the right side and zero rows below. There are no or infinite solutions.



https://www.youtube.com/watch?v=9Q1q7s1jTzU

- $A^TA = AA^T$ and hence is symmetric
- A^TA is invertible iff A has linearly independent columns.
- For a projection matrix P, $P^T = P$ and $P^2 = P$