Review for exam

The fundamental theorem of invertible matrices

Suppose a is an $n \times n$ matrix, the following statements are equivalent:

$$\text{A is invertible}$$

$$\text{Solutions + Matrix forms:}$$

$$a\vec{x} = \vec{b} \text{ has a unique solution for every } \vec{b} \in \mathbb{R}^n$$

$$A\vec{x} = \vec{0} \text{ has only the trivial solution}$$

$$\text{The RREF of A is } I_n$$

$$\text{A is a product of elementary matrices}$$

$$\text{Columns:}$$

$$\text{The column vectors of A are linearly independent}$$

$$\text{The column vectors of A span } \mathbb{R}^n$$

$$\text{The column vectors of A for a basis for } \mathbb{R}^n$$

$$\text{Subspaces:}$$

$$\text{Rank(A)} = n$$

$$\text{Nullity(A)} = 0$$

$$\text{Rows:}$$

$$\text{The row vectors of A are linearly indepenent}$$

$$\text{The row vectors of A span } \mathbb{R}^n$$

$$\text{The row vectors of A form a basis for } \mathbb{R}^n$$

text