MTH207

Linear Algebra

Ho Han Sheng

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❖ Lecture 1 (Linear Equations in Linear Algebra)

1.1 Systems of Linear Equations

Definition 1.1 (Linear Equation)**.** $a_1x_1 + a_2x_2 + \ldots + a_nx_n = b$

Definition 1.2 (A system of linear equations; Linear System)**.** A collection of one or more linear equations involving the same set of variables, say, $x_1, x_2, \ldots, x_n$

Definition 1.3 (Solution of a Linear System)**.** A list $(s_1, s_2, \ldots, s_n)$ of numbers that makes each equation in the system true when the values $s_1, s_2, \ldots, s_n$ are substituted for $x_1, x_2, \ldots, x_n$ respectively.

A **consistent** system has either one solution or infinitely many solutions

An **inconsistent** system has no solution.

Theorem 1.4. A system of linear equations has (1) no solution, (2) exactly one solution, or (3) infinitely many solutions.

Definition 1.5 (Solution set)**.** The set of all possible solutions of a linear system.

Definition 1.6 (Equivalent systems)**.** Two linear systems with the same solution set.

1.2 Vectors and Matrices