Today: §1.9: The Matrix of a Linear Transformation Next: §2.1: Matrix Operations

Reminders:

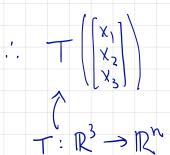
My MathLab Homework #3: Due Mon, Jan 29.

MATLAB Homework #2: Due TONIGHT

Midterm 1: Next Wed, Jan 31, 8-10pm. L> practice midterns posted on webpage L> seat assignment posted on Triton Ed. A function/transformation T: Rn -> Rm is called inear

Eg.

- if it respects addition and scalar multiplication.
 - $T(\underline{u}+\underline{v}) = T(\underline{u}) + T(\underline{v})$ $T(c\underline{u}) = cT(\underline{u})$
- $\begin{array}{c} T(0) = \\ T(c_1 \vee + c_2 \vee + \cdots + c_k \vee k) = \end{array}$



Definition The standard basis vectors in IR" are Eq. In R², there are 2 standard basis vectors In 123, there are 3 They are the columns of the identity matrix 100...0 010-0 0 1 ... 0

Theorem. A linear transformation T is completely determined

by its image on the standard basis vectors

 $T(e_1), T(e_2), \dots, T(e_n), T: \mathbb{R}^n \to \mathbb{R}^n$

Moreover, every linear transformation is q matrix transformation!

Eg. The "identity" function T(x)=x is linear. What is its matrix?

Eq. The rotation cen 45° is linear. (Why?) Whet is its matrix ?



one-to-one

E.g. Every rotation is both one-to-one and onto.

 $E_{g} T(x) = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & 1 \end{bmatrix} x$

