Linear Algebra(1)

Matrices & Vectors

Linear System, Gauss Elimination

Vector Space, Subspace

Determinant of a matrix

Inverse matrix, Cramer’s Rule

Linear Algebra(2)

Orthogonality

Eigenvalues & Eigenvectors

Similarity transformation

Diagonalization

Quadratic form

Introduction to matrices

- matrices & vectors
- addition & scalar multiplication
- product of matrices
  - 행렬의 곱셈을 해석하는 여러가지 방법
- transpose of a matrix, symmetric matrix
- triangular matrix, diagonal matrix, inverse matrix
- matrix as an operation

Matrix & Vector

$$\mathrm{A} = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix}$$

$$v \quad = \begin{bmatrix} a_{1j} \\ \vdots \\ a_{mj} \end{bmatrix}$$

$$w = \begin{bmatrix} a_{i1} & \cdots & a_{in} \end{bmatrix}$$

addition & scalar multiplication

Rules for addition & scalar multiplication

- for $A, B, C \in R^{m\times n}$ and $c, k \in R$,

$$A + B = B + A$$

$$(A + B) + C = A + (B + C)$$

$$A + O = A$$

$$A + (-A) = O$$

$$c(A + B) = cA + cB$$

$$(c + k)A = cA + kA$$

$$(ck)A = c(kA)$$

$$1A = A$$

product of matrices

- for $A \in R^{m \times r}$, $B \in R^{r \times p}$, AB is definned by

Rules for product of matrices

- for $A, B, C \in R^{m\times n}$ and $k \in R$,

$$k(AB) = (kA)B = A(kB)$$

$$(AB)C = A(BC)$$

$$(A+B)C = AC + BC$$

$$C(A+B) = CA + CB$$

행렬의 곱셈에 관한 해석

- 행렬과 열벡터의 곱
- 행벡터와 행렬의 곱

matrix as an operation

- permutation matrix
- elimination matrix

Transpose matrix

- definition

- rules： for $A, B \in R^{m \times n}$ and $k \in R$,

$$(A^T)^T = A$$

$$(A+B)^T = A^T + B^T$$

$$(kA)^T = kA^T$$

$$(AB)^T = B^T A^T$$