

## 〈Basic Linear Algebra〉

### Inverse Matrix

Inverse of a 2×2 matrix

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \quad (0.10)$$

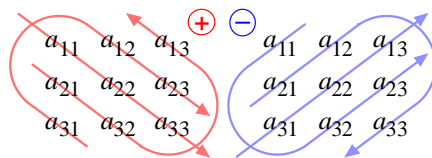
### Determinant

Determinant of a 2×2 matrix

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc \quad (0.11)$$

Determinant of a 3×3 matrix

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = a_{11}a_{22}a_{33} + a_{21}a_{32}a_{13} + a_{31}a_{12}a_{23} - a_{11}a_{32}a_{23} - a_{21}a_{12}a_{33} - a_{31}a_{22}a_{13} \quad (0.12)$$



### Eigenvalue and Eigenvector

The eigenvalues,  $\lambda_1, \lambda_2, \dots, \lambda_n$ , of  $n$ -dimensional square matrix  $\mathbf{A}$  can be calculated as the solutions to the eigen equation,

$$|\mathbf{A} - \lambda\mathbf{E}| = 0 \quad (0.13)$$

The corresponding eigenvector  $\mathbf{s}_i$  can be obtained from the definition,

$$\mathbf{A}\mathbf{s}_i = \lambda_i\mathbf{s}_i \quad (0.14)$$

For example for a 2×2 matrix,  $\mathbf{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ , the eigen equation is

$$|\mathbf{A} - \lambda\mathbf{E}| = \begin{vmatrix} a-\lambda & b \\ c & d-\lambda \end{vmatrix} = (a-\lambda)(d-\lambda) - bc = 0$$

## 〈Arrhenius Equation〉

The temperature dependence of rate constants can be expressed by the Arrhenius equation or the modified Arrhenius equation.

$$k = A \exp\left(-\frac{E_a}{RT}\right) \quad \text{Arrhenius equation} \quad (0.15)$$

$$k = AT^b \exp\left(-\frac{E_a}{RT}\right) \quad \text{Modified Arrhenius equation} \quad (0.16)$$

## 〈Schedule〉

[5] June 22 (Wed) 8:30~

[6] June 27 (Mon) 13:00~

[7] June 29 (Wed) 8:30~

[8] July 4 (Mon) 13:00~

[Problem-2] Due Date: 17:00 July 19 (to the box in the dept. office)

# The paper (report) must be submitted until the due date.

# Submissions via e-mail will not be accepted.