

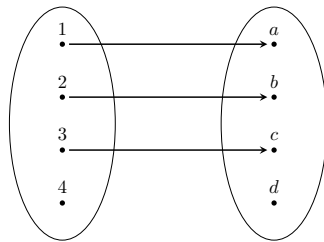
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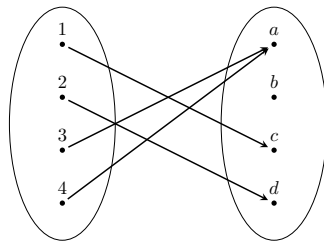
## 1 Functions

1. 집합  $X = \{1, 2, 3, 4\}$ 이고 집합  $Y = \{a, b, c, d\}$ 일 때, 다음 관계중  $X$ 에서  $Y$ 로의 함수인 것을 고르시오.

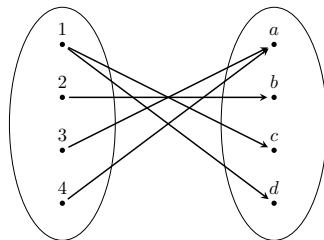
- (a)  $R_1 = \{(1, a), (2, b), (3, c)\}$   
Not a function (1 is not mapped)



- (b)  $R_2 = \{(1, c), (2, d), (3, a), (4, a)\}$   
a function

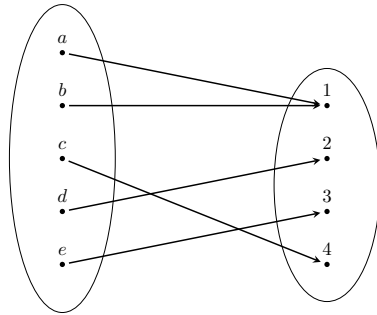


- (b)  $R_3 = \{(1, c), (1, d), (2, b), (3, a), (4, a)\}$   
Not a function (1 is mapped twice)

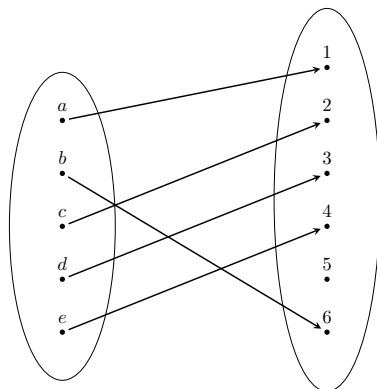


2. 다음 함수들에 대하여 전사 함수, 단사(일대일) 함수, 전단사 (일대일 전사) 함수를 판별하시오.

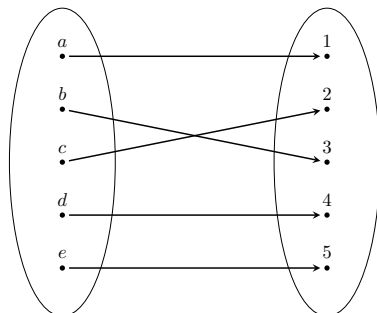
- (a)  $R_4 = \{(a, 1), (b, 1), (c, 4), (d, 2), (e, 3)\}$   
 $X = \{a, b, c, d, e\}$ ,  $Y = \{1, 2, 3, 4\}$ 을 가정  
 전사함수 (Surjective, Onto Function)



- (b)  $R_5 = \{(a, 1), (b, 6), (c, 2), (d, 3), (e, 4)\}$   
 $X = \{a, b, c, d, e\}$ ,  $Y = \{1, 2, 3, 4, 5, 6\}$ 을 가정  
 단사함수 (Injective, One-to-one Function)



- (b)  $R_6 = \{(a, 1), (b, 3), (c, 2), (d, 4), (e, 5)\}$   
 $X = \{a, b, c, d, e\}$ ,  $Y = \{1, 2, 3, 4, 5\}$ 을 가정  
 전단사함수 (Bijjective, One-to-one Correspondence Function)



## 2 Matrices

다음은 matrix  $A, B$ 에 관한 문제이다

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$$

1.  $A + B$ 를 구하시오.

$$\begin{bmatrix} 2 & 5 \\ 5 & 8 \end{bmatrix}$$

2.  $AB$ 를 구하시오.

$$\begin{bmatrix} 5 & 11 \\ 11 & 25 \end{bmatrix}$$

3.  $BA$ 를 구하시오.

$$\begin{bmatrix} 10 & 14 \\ 14 & 20 \end{bmatrix}$$

4. matrix  $A$ 의 행렬식  $|A|$ 를 구하시오.  $-2$

5. matrix  $B$ 의 행렬식  $|B|$ 를 구하시오.  $-2$

6. matrix  $A$ 의 역행렬  $A^{-1}$ 를 구하시오.

$$\begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$$

7. matrix  $B$ 의 역행렬  $B^{-1}$ 를 구하시오.

$$\begin{bmatrix} -2 & \frac{3}{2} \\ 1 & -\frac{1}{2} \end{bmatrix}$$

다음은 연립방정식에 관한 문제이다.

$$\begin{cases} 2x_1 + x_2 - x_3 = 8 \\ -3x_1 - x_2 + 2x_3 = -11 \\ -2x_1 + x_2 + 2x_3 = -3 \end{cases}$$

1.  $Ax = b$ 의 형태로 쓰시오.

$$\begin{bmatrix} 2 & 1 & -1 \\ -3 & -1 & 2 \\ -2 & 1 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 8 \\ -11 \\ -3 \end{bmatrix}$$

2. Sarrus' Rule을 사용하여 행렬식  $|A|$ 을 구하시오.

$$\left[ \begin{array}{ccc|cc} 2 & 1 & -1 & 2 & 1 \\ -3 & -1 & 2 & -3 & -1 \\ -2 & 1 & 2 & -2 & 1 \end{array} \right]$$

$$\begin{aligned} & (2)(-1)(2) + (1)(2)(-2) + (-1)(-3)(1) - (-1)(-1)(-2) - (2)(2)(1) - (1)(-3)(2) \\ & = -4 - 4 + 3 + 2 - 4 + 6 = -1 \end{aligned}$$

3. Cramer's rule을 사용하여  $x_1, x_2, x_3$ 를 구하시오.

$$\begin{vmatrix} 8 & 1 & -1 \\ -11 & -1 & 2 \\ -3 & 1 & 2 \end{vmatrix} = -2, \quad \begin{vmatrix} 2 & 8 & -1 \\ -3 & -11 & 2 \\ -2 & -3 & 2 \end{vmatrix} = -3, \quad \begin{vmatrix} 2 & 1 & 8 \\ -3 & -1 & -11 \\ -2 & 1 & -3 \end{vmatrix} = 1$$

$$x_1 = 2, \quad x_2 = 3, \quad x_3 = -1$$