

ព្រះរាជាណាចក្រកម្ពុជា  
ជាតិ សាសនា ព្រះមហាក្សត្រ

Institute of technology of Cambodia

Department of Information and communication Engineering



TP03: Relation Function and Sequences

Cours: Theory of Computer Science

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Group: I3-GIC-C

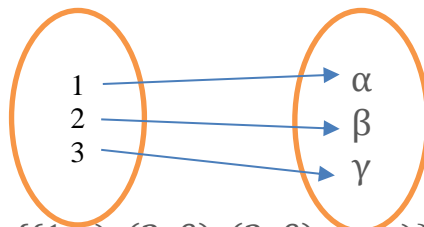
Year: 2022-2022

1)

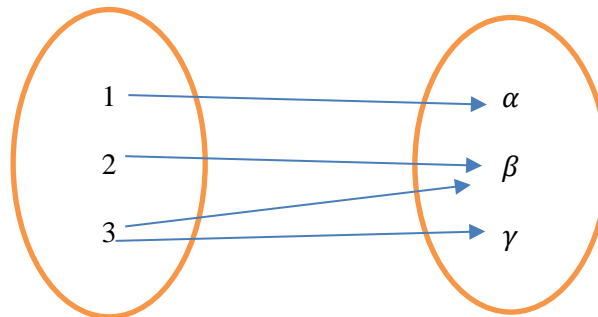
- Reflexive: for all  $x$ ,  $xRx$   
Ex: Relation  $\ll$ is equal to $\gg$ ,  $\ll$ is a subset of $\gg$ ,  $\ll$ devides $\gg$ .
- Irreflexive: for all  $x$ ,  $x \not R x$   
Ex: Relation  $\ll$ is greater than $\gg$ ,  $\ll$ is not equal to $\gg$ .
- Transitive:  $(xRy \text{ and } yRz) \Rightarrow xRz$   
Ex: Relation  $\ll$ is parallel to $\gg$ ,  $\ll$ is greater than $\gg$ ,  $\ll$ is equal to $\gg$ .
- Symmetric:  $xRy \Rightarrow yRx$   
Ex: Relation  $\ll$ is married to $\gg$ ,  $\ll$ is equal to $\gg$ ,  $\ll$ is brother or sister of $\gg$ .
- Antisymmetric:  $(xRy \text{ and } yRx) \Rightarrow x=y$   
Ex: Relation  $\ll$ divides $\gg$ ,  $\ll$ is equal to $\gg$ .
- Asymmetric: for all  $x$  and  $y$ ,  $xRy \Rightarrow y \not R x$   
Ex: Relation  $\ll$ is less than $\gg$ ,  $\ll$ is greater than $\gg$ .

2) Differences between function and not function:

- Function:  $f = \{(1, \alpha), (2, \beta), (3, \gamma)\}$  uniqueness



- Not function:  $f = \{(1, \alpha), (2, \beta), (3, \beta), (3, \gamma)\}$  uniqueness violated for 3, appears twice:  $f(3) = \beta$  and  $f(3) = \gamma$



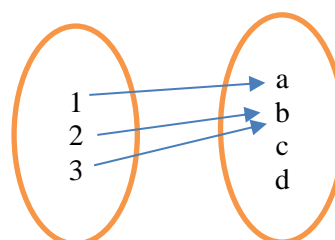
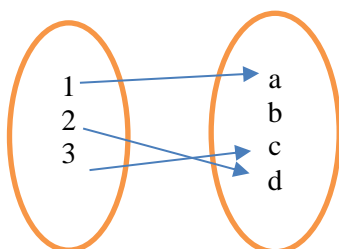
3)

- Injection function:
  - "one- to- one "or "1 - 1"
  - $\forall x \forall y (f(x) = f(y) \Rightarrow x = y)$
  - for  $f: A \rightarrow B$ , the element in  $B$  are "hit" at most once

Injective

Not Injective

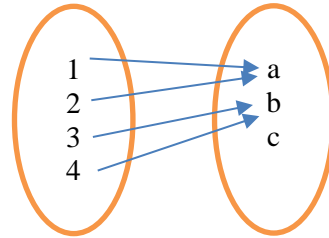
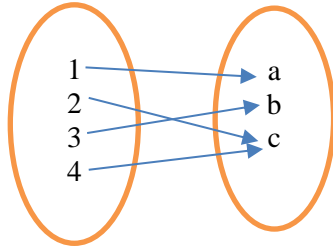
A



4)

➤ Surjection function:

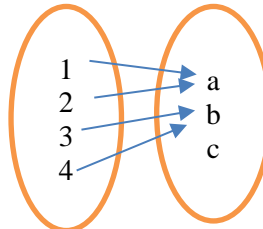
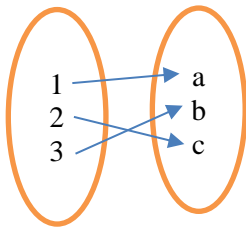
- “on to”
  - $\forall y \exists x (y = f(x))$
  - For  $f: A \rightarrow B$ , the elements in B are “hit” at least once
- Surjective                      Not Surjective



5)

➤ Bijection function: is an injection ( one-to-one) and ( onto) or (1-1 correspondence).

- $\forall x \forall y (f(x) = f(y) \Rightarrow x = y) \cap \forall y \forall x (y = f(x))$
  - For  $f: A \rightarrow B$ , every B element is “hit” once and only once
- Bijection                      Not Bijection



6) we have “1, 3, -5, 8, 11, 17”

=> it is noq sequence because set of element not written in order list.

7) if we have a sequence “2, 3, 5, 7, 11, 17” it is prime number.

8) if we have a sequence “0, 1, 1, 2, 3, 5, 8, 13, 21, 34” it is Fibonacci sequence.