

# CS & IT ENGINEERING

DISCRETE MATHS  
Set theory

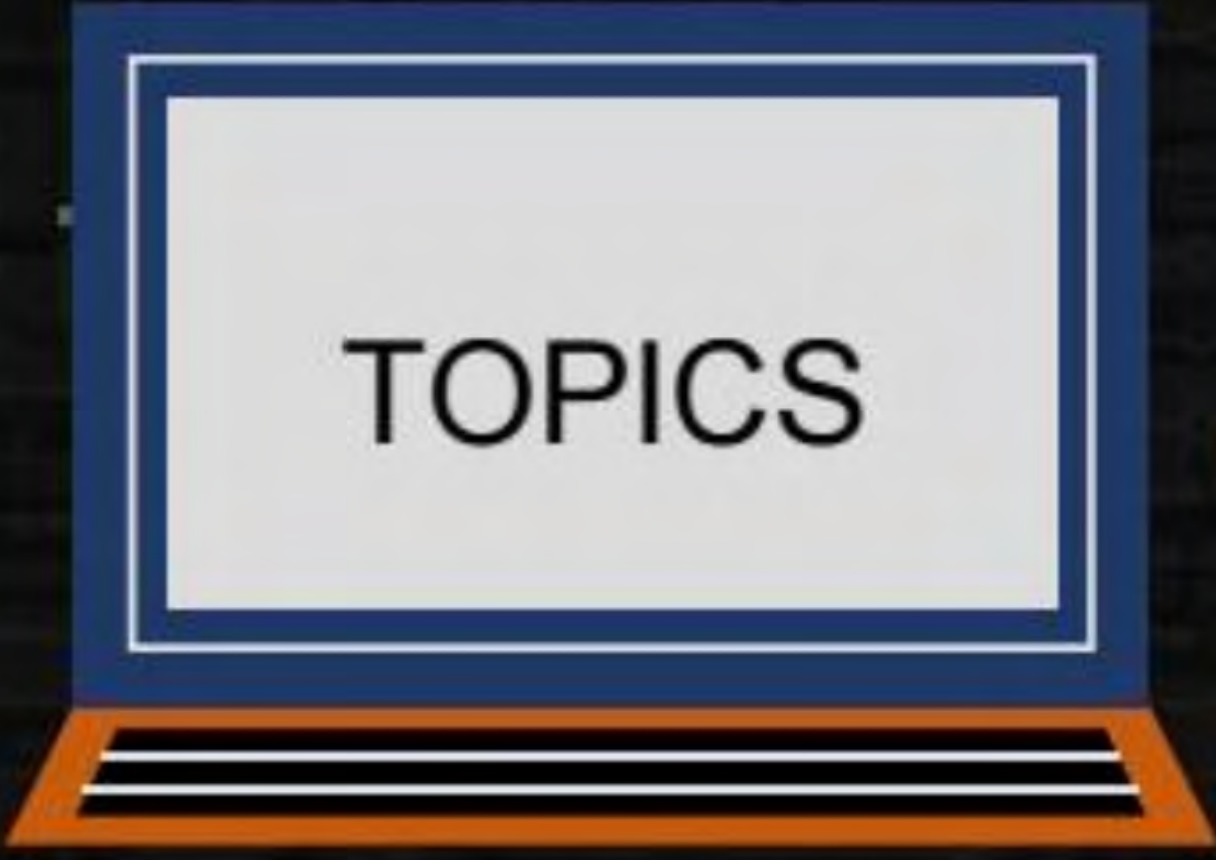


Lecture No.06



By- SATISH YADAV SIR





# TOPICS

01 Types of functions

02 Composition of functions

03 Inverse function

1) if  $f$  &  $g$  are 1:1 then  $g \circ f$  is 1:1. (True)

1A) { if  $g \circ f$  is 1:1 then  $f$  is 1:1

1B) { if  $g \circ f$  is 1:1 then  $g$  is 1:1.

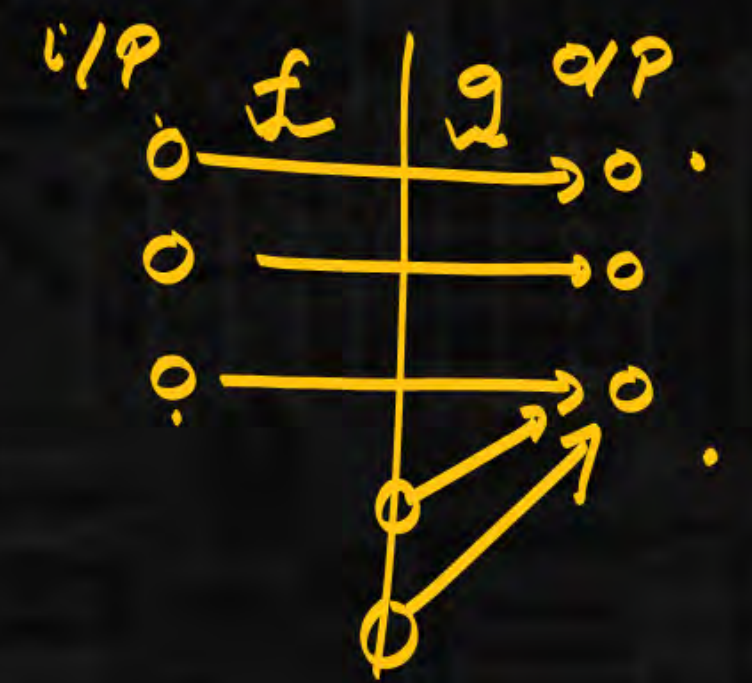
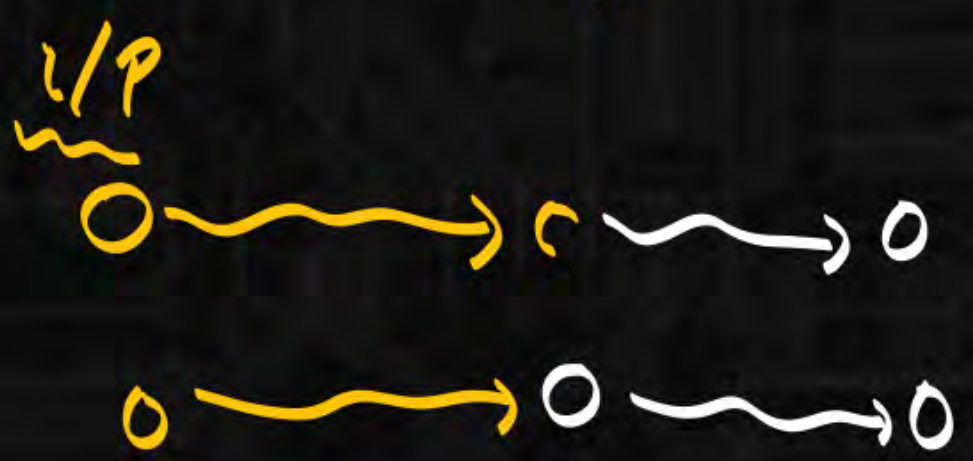
2) if  $f$  &  $g$  are onto then  $g \circ f$  is onto. (True)

2A) if  $g \circ f$  is onto then  $f$  is onto.

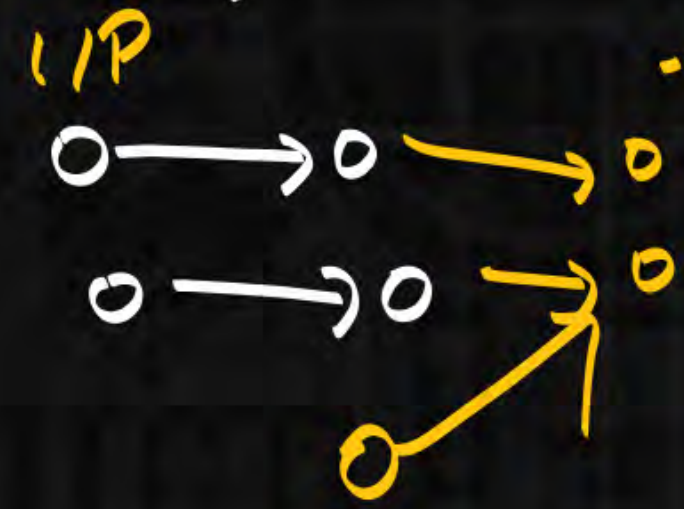
2B) if  $g \circ f$  is onto then  $g$  is onto.



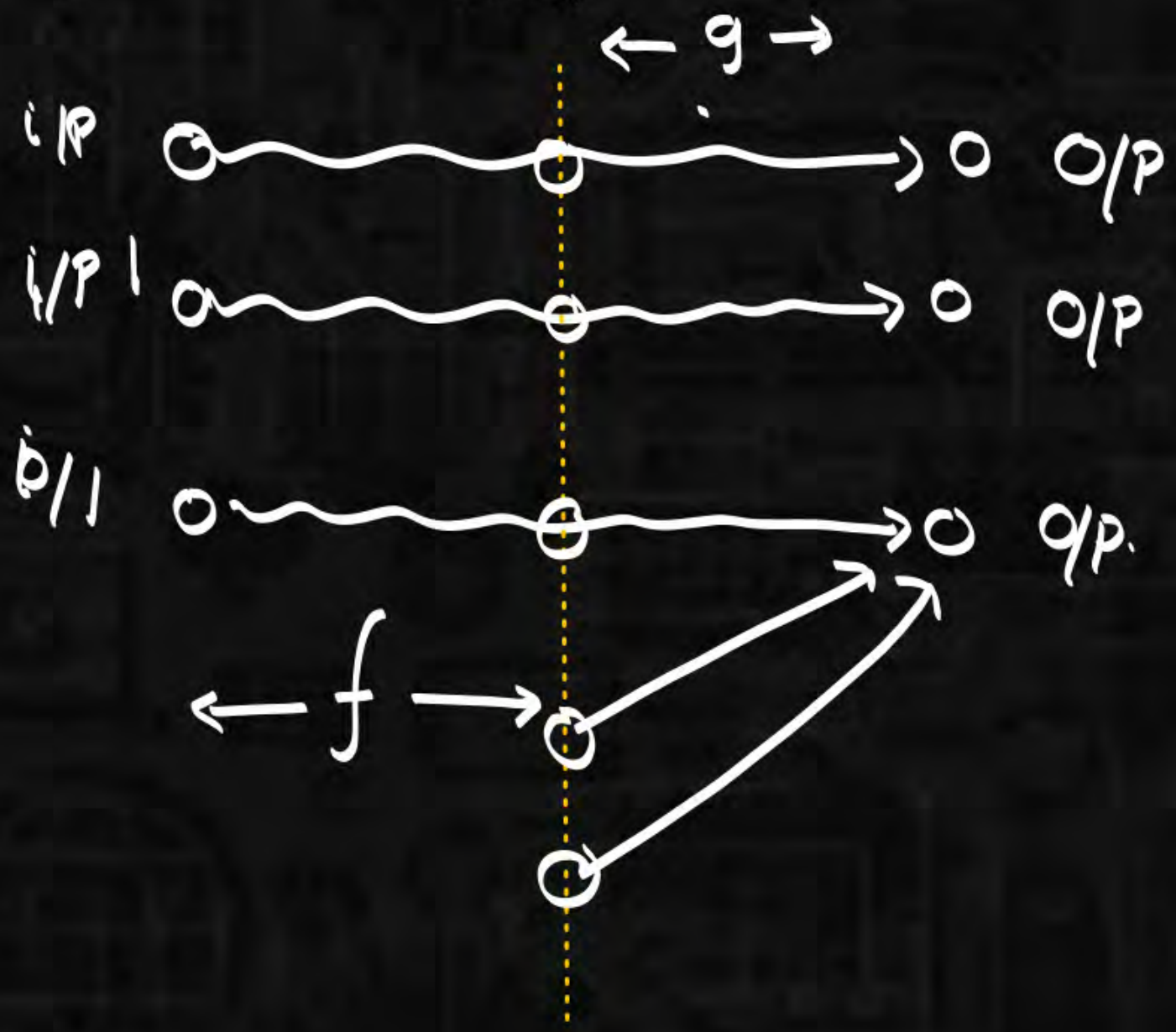
1A) if gof is 1:1 then f is 1:1 (True)  
check.



1B) if gof is 1:1 then g is 1:1.  
- o/p (false)



if  $g \circ f$  is 1:1.  
True



if  $g \circ f$  is 1:1 then  $f$  is 1:1. (True)

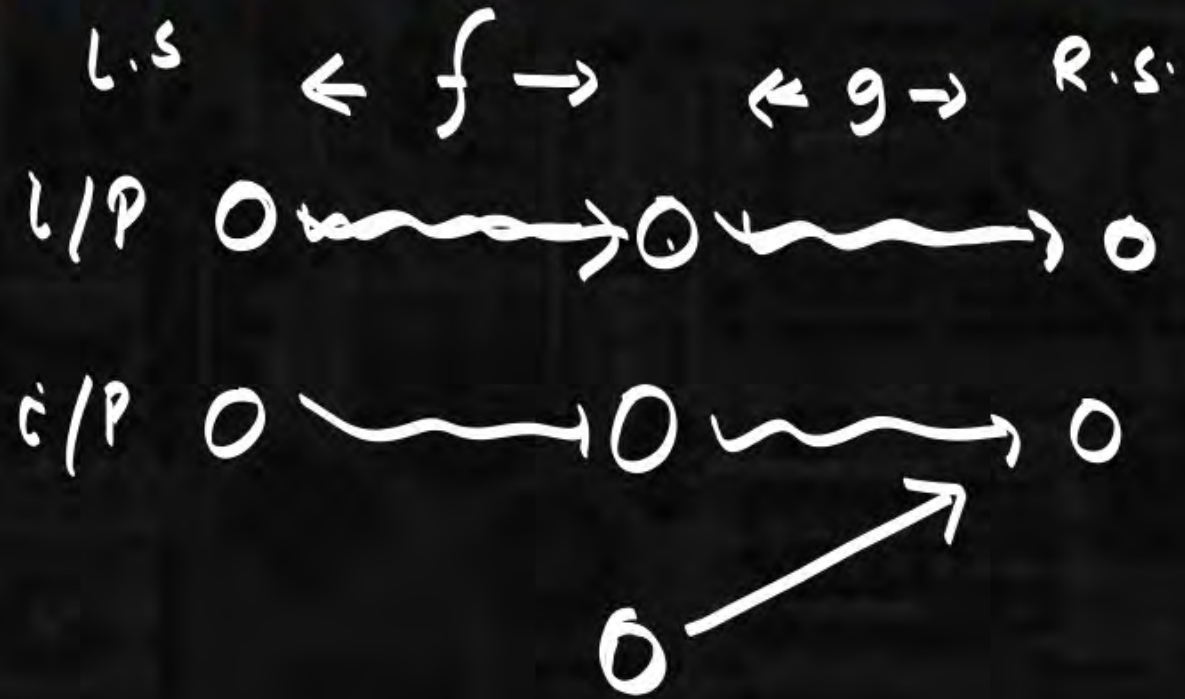
if  $g \circ f$  is 1:1 then  $g$  is 1:1. (False)



2A) if  $g \circ f$  is onto then  $f$  is onto

(True)

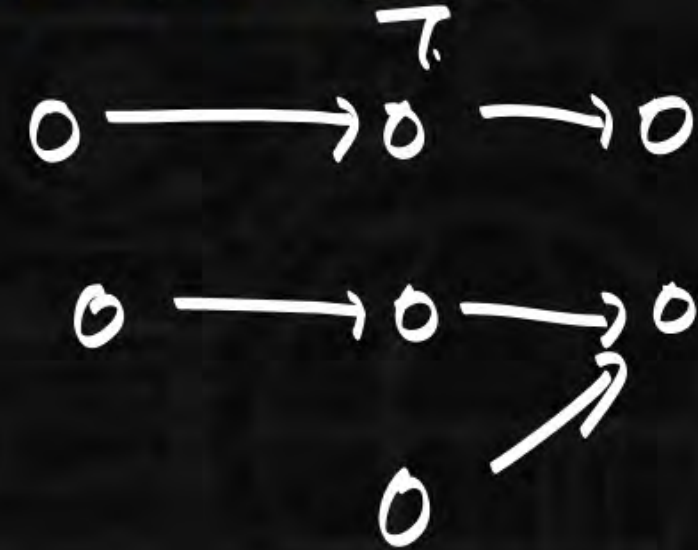
(false)



2B) if  $g \circ f$  is onto then  $g$  is onto

(True)

(True)



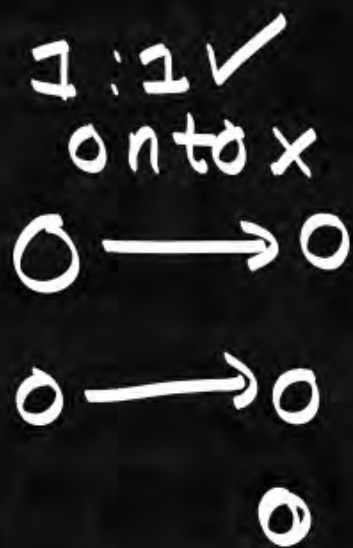
1:1 correspondance: (Bijective)

$f: A \rightarrow B$

$\left\{ \begin{array}{l} \text{1:1} \wedge \text{onto} \\ \text{injective} \wedge \text{surjective} \end{array} \right.$

$f: A \rightarrow B$   
1:1 correspondance  
 $|A| = |B|$

$|A| \leq |B|$   $\wedge$   $|A| \geq |B|$   $\rightarrow (A=B)$

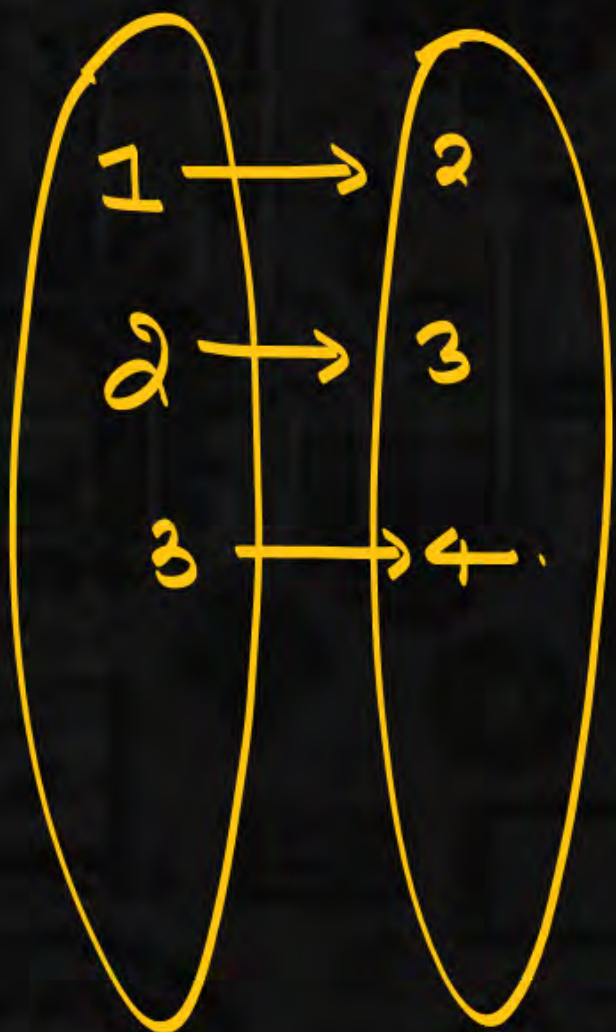


1:1 ✓  
onto ✓  
1:1C ✓



$$f(n) = n + 1, \quad f: \underline{2} \rightarrow \underline{2}$$

$$(1:10)$$



$f: \underline{G_1} \rightarrow \underline{G_2}$  are isomorphic.

$$f: V_1 \rightarrow V_2 \quad f: E_1 \rightarrow E_2$$

0

0

$$0 \rightarrow 0$$

0

0

$$0 \rightarrow 0$$

0

0

$$0 \rightarrow 0$$

0

0



$G_1, G_2$  are isomorphic to each other.

$$f: G_1 \rightarrow G_2 \text{ (1:1)}$$

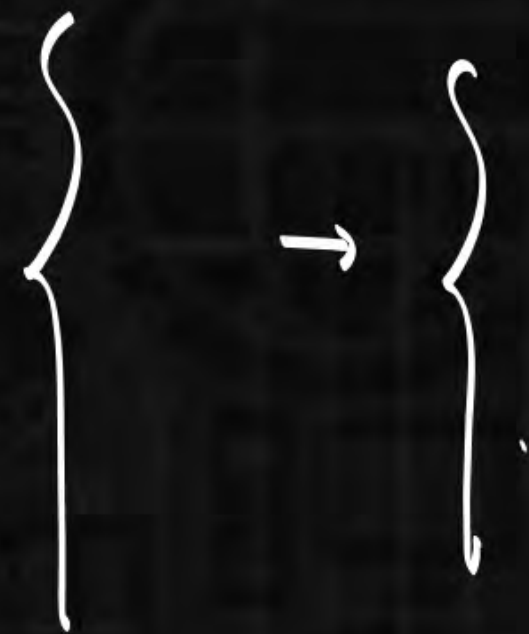
$$G_1 = (V_1, E_1, \psi_1)$$

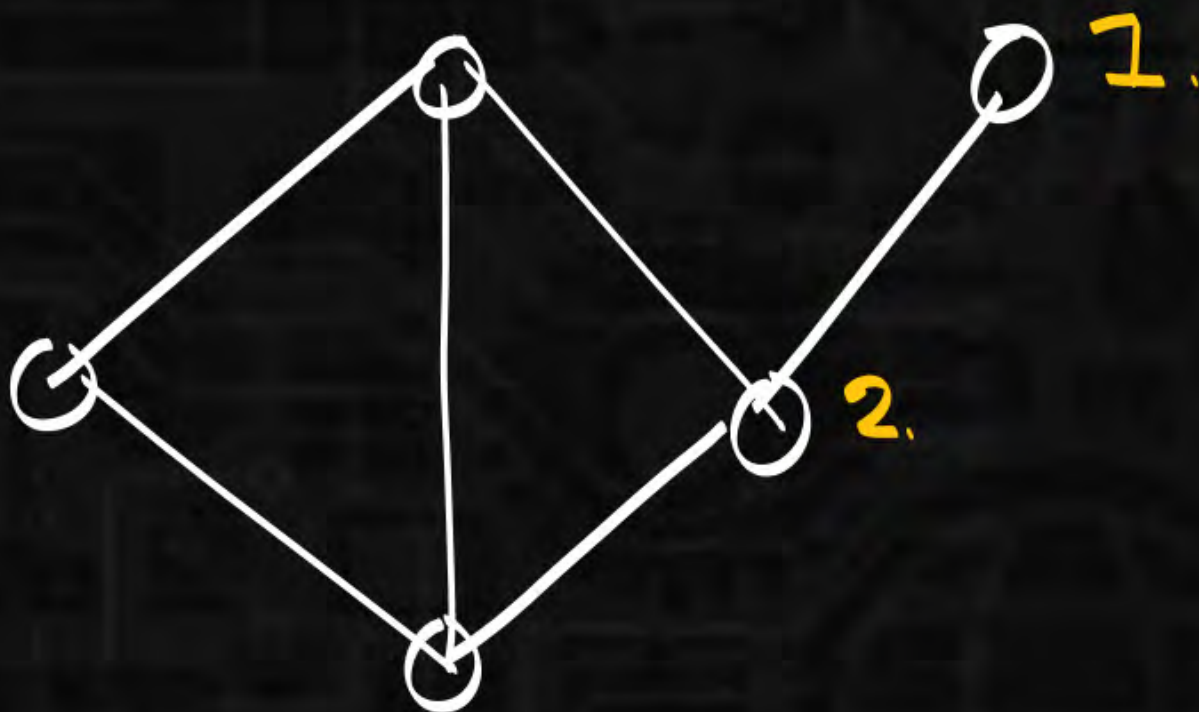
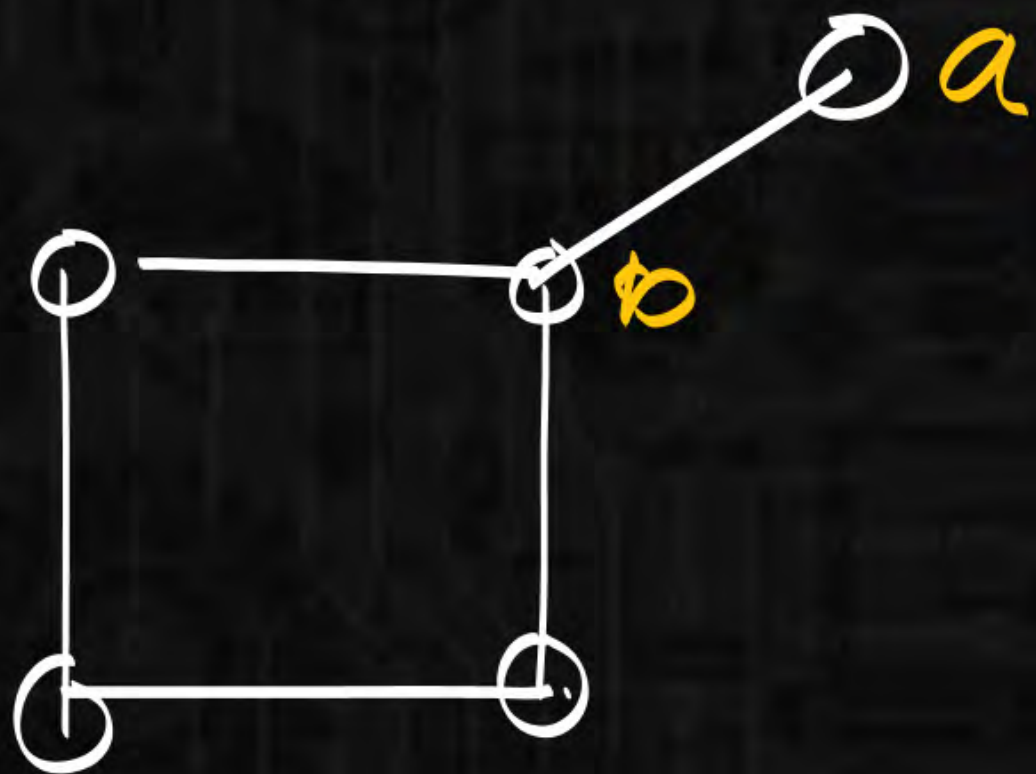
$$G_2 = (V_2, E_2, \psi_2)$$

$$f: V_1 \rightarrow V_2$$

$$f: E_1 \rightarrow E_2$$

$$f: \psi_1 \rightarrow \psi_2$$





$f: V_1 \rightarrow V_2.$

$a \rightarrow 1.$   
 $b \rightarrow 2$



$0 \rightarrow F$   
 $1 \rightarrow T$

subset  
a b c

f f f	0 0 0	$\rightarrow \emptyset$
f f T	0 0 1	$\rightarrow \{c\}$
f T f	0 1 0	$\rightarrow \{b\}$
	0 1 1	$\rightarrow \{b, c\}$
	1 0 0	$\rightarrow \{a\}$
	1 0 1	$\rightarrow \{a, c\}$
	1 1 0	$\rightarrow \{a, b\}$
	1 1 1	$\rightarrow \{a, b, c\}$

a b c  
 0 0 0  $\rightarrow \emptyset$   
 1 0 0  $\rightarrow \{a\}$

Total  
subsets =  $2^3$

$$f: A \rightarrow B \text{ (1:1c)}$$

$$|A| = |B| = \underline{n}.$$

$$\text{Total 1:1c Functions} = n!.$$



$$f: \mathbb{Z} \rightarrow \mathbb{Z}.$$

$$f(x) = x + 1.$$

$$0 \longrightarrow 1$$

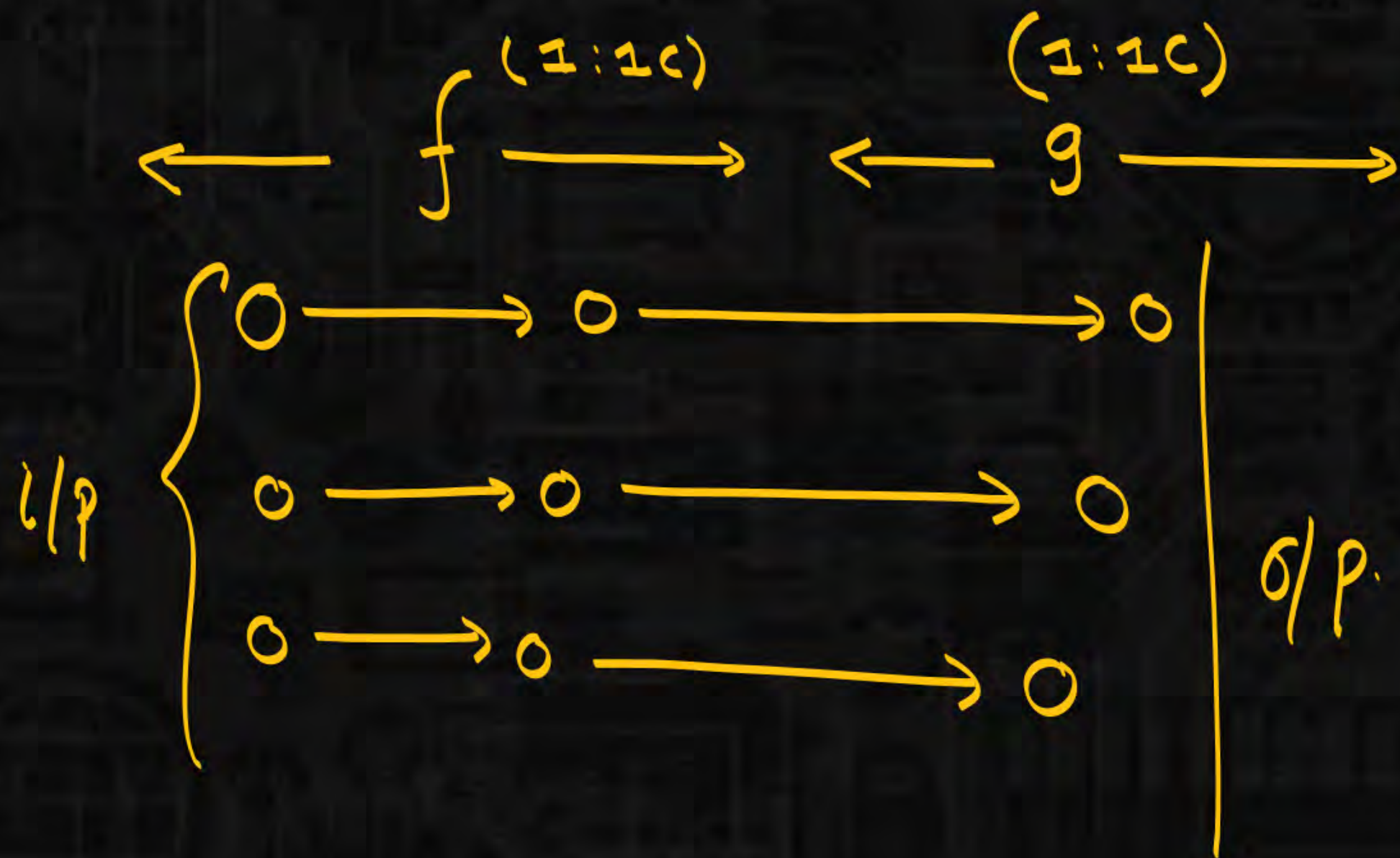
$$1 \longrightarrow 2$$

$$3 \longrightarrow 4$$

⋮

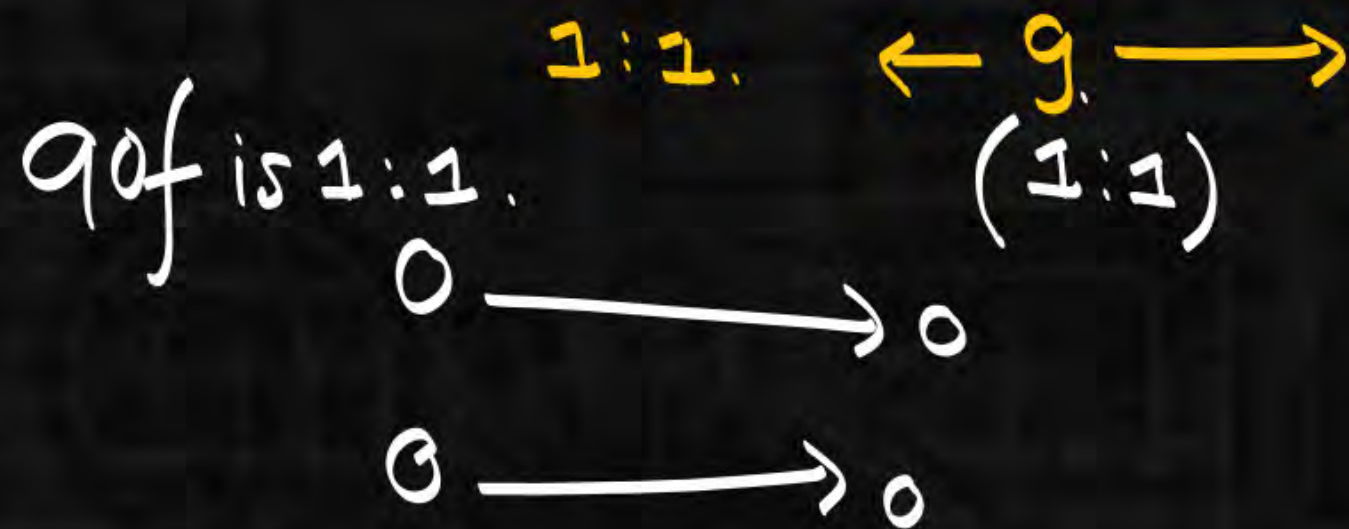
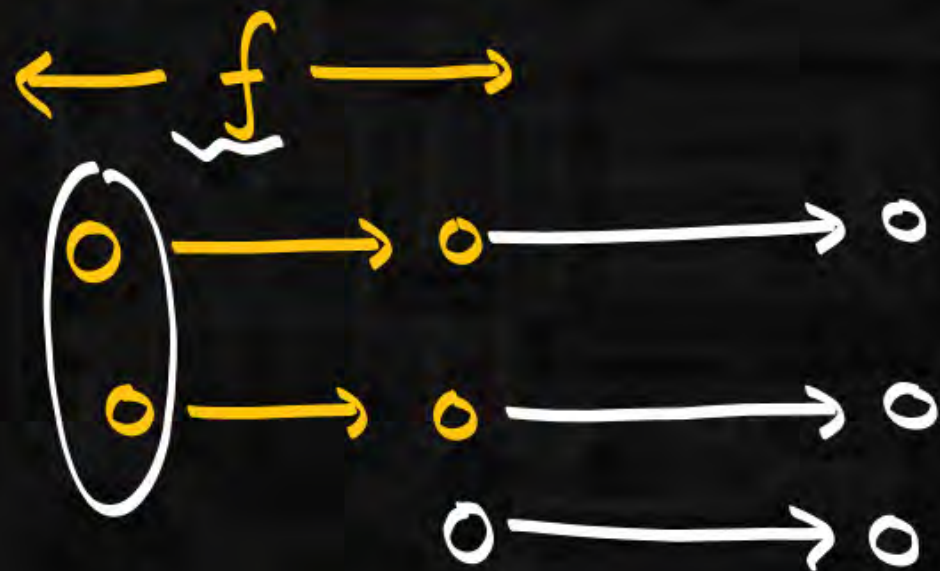
⋮

1) if  $f$  &  $g$  are 1:1c then  $g \circ f$  is 1:1c.  
(True)



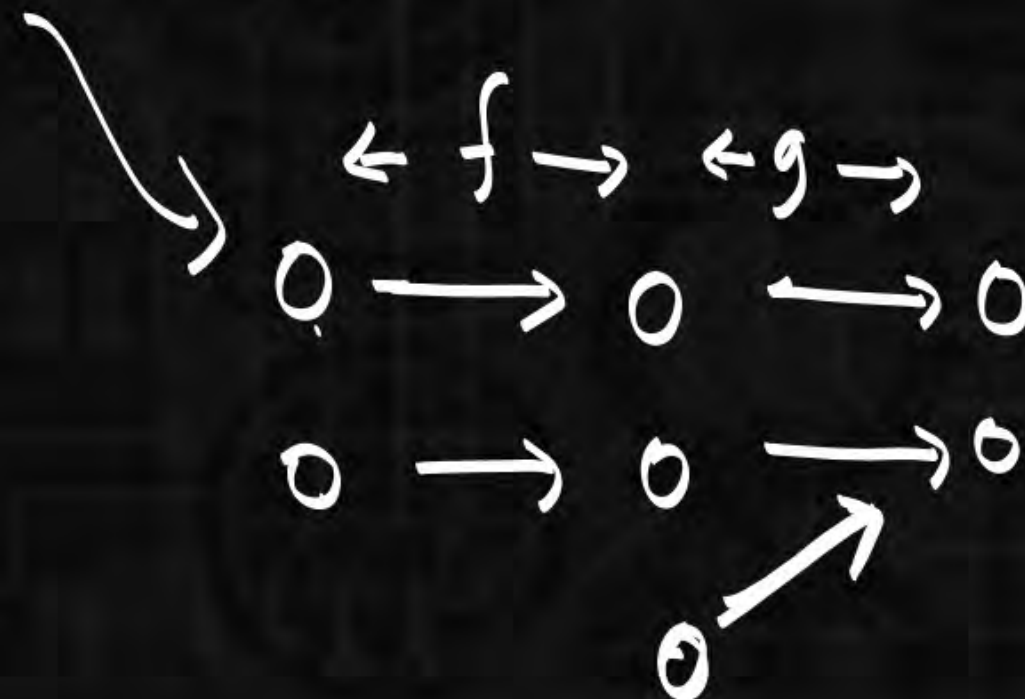


1)  $f$  &  $g$  are 1:1 then  $g \circ f$  is 1:1.



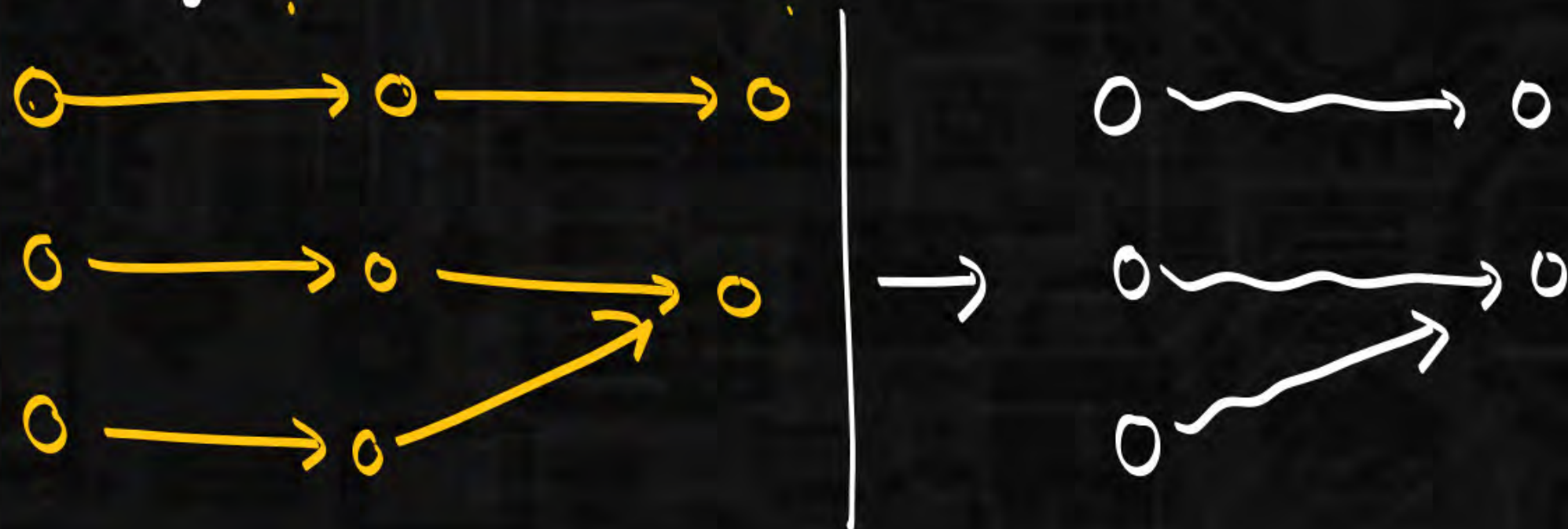
(A)

if  $g \circ f$  is 1:1 then  $g$  is 1:1  
(false)



if  $f$  &  $g$  are onto then  $g \circ f$  is onto. (True)

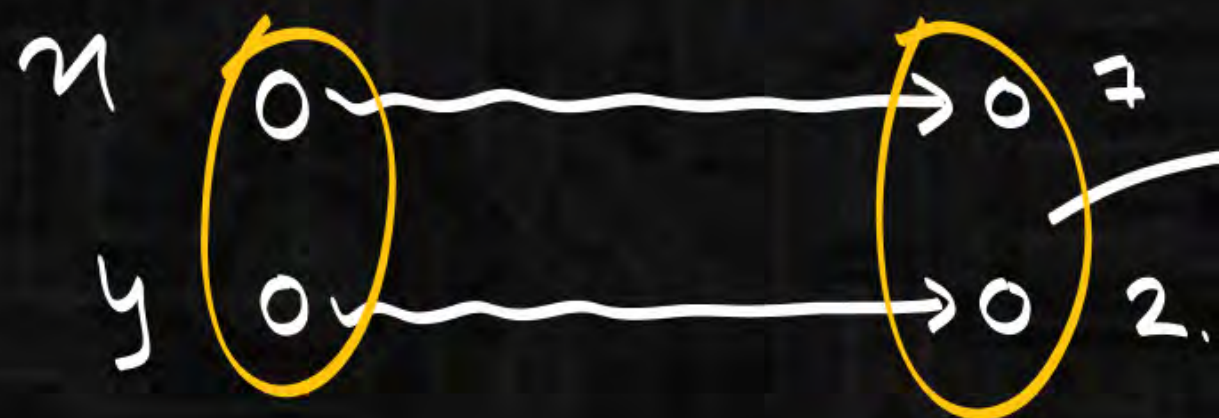
(Full)  $f$  (onto) (Full)  $g$  (onto)



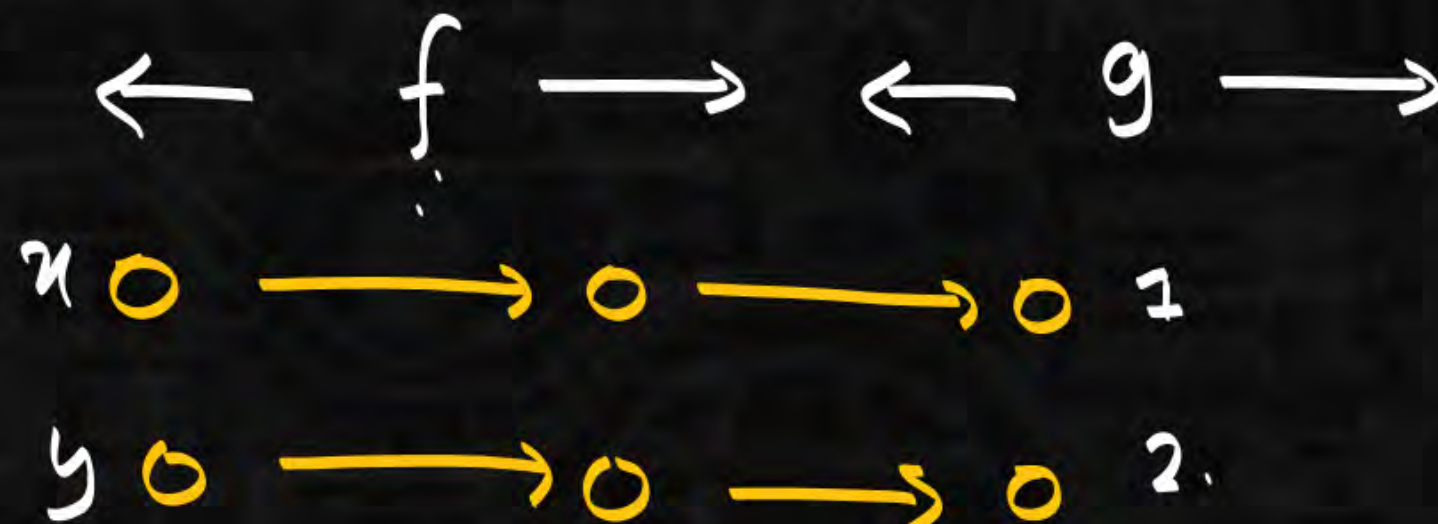


if  $g \circ f$  is onto then  $f$  is onto (false)

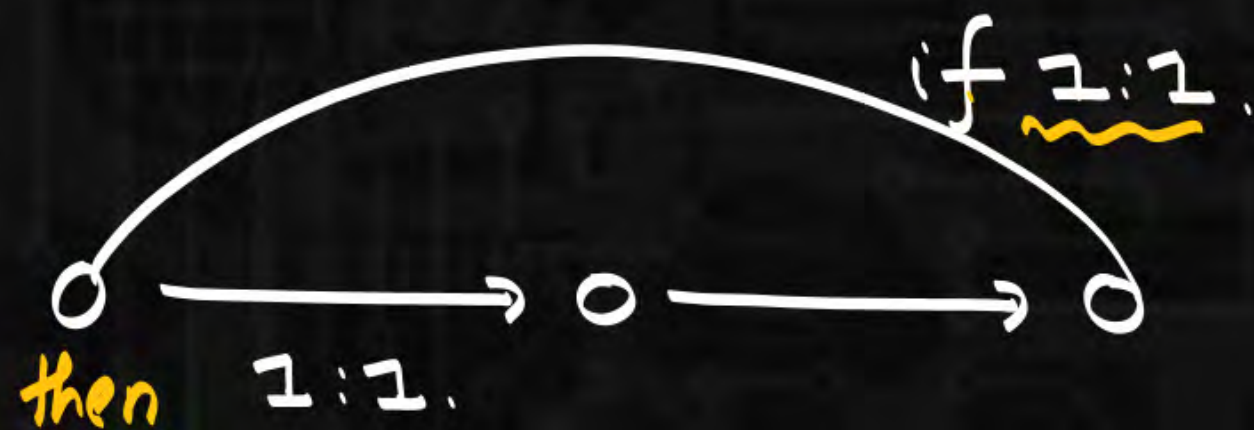
True



R.S full.



(R.S is not full)



$g \circ f$  is 1:1  $\rightarrow f$  is 1:1 ✓  
 $g \circ f$  is onto  $\rightarrow g$  is onto ✓

