CS & IT ENGINEERING

DISCRETE MATHS
SET THEORY

Compositions Of Functions

Lecture No. 5

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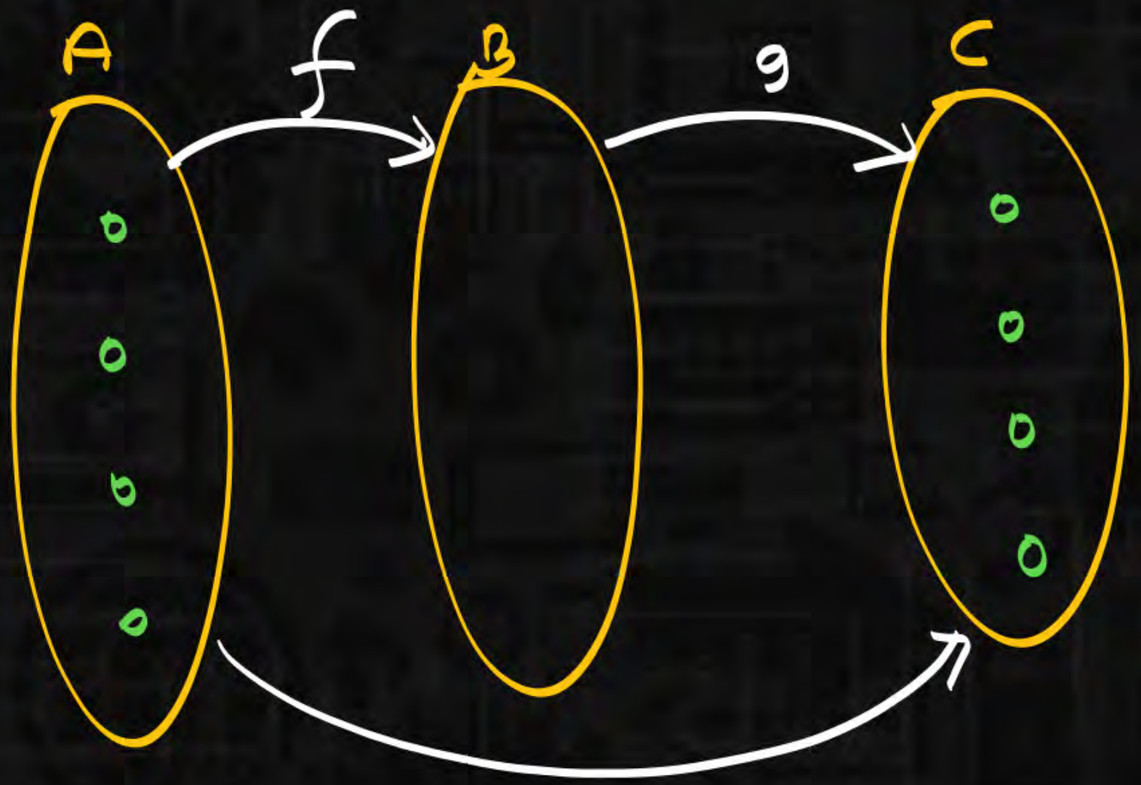
01 Composition of Function

02 Theorems in Composition of function

03 Examples in Composition of function

Functions

$f : A \to B$ $\quad g : B \to C$.

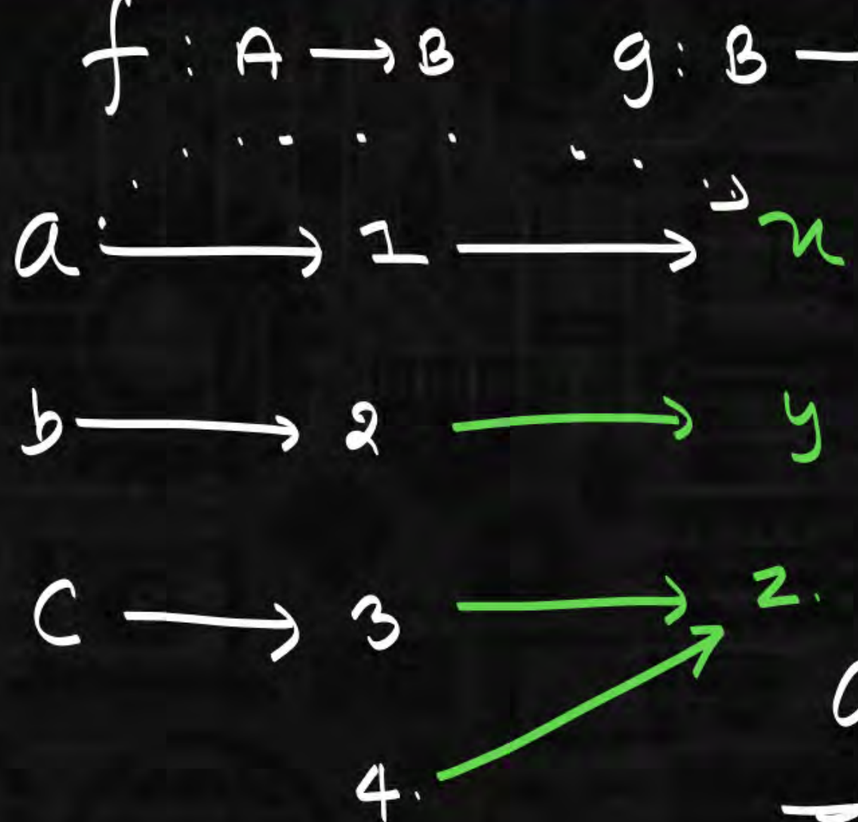


composition of function : $A \to C$.

$gof : A \to C$.

Functions

$f: A \to B$ $\quad$ $g: B \to C$



$f: A \to B$

$f(a) = 1$

$f(b) = 2$

$f(c) = 3$

$g: B \to C$

$g(1) = x$. $g(2)$

$g(f(a)) = x$

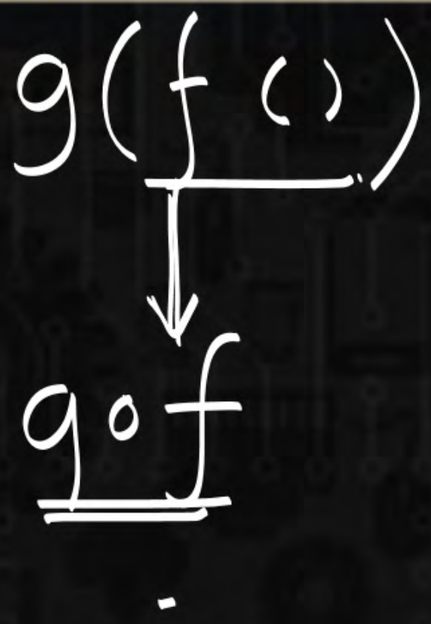
$g(2) = y$.

$g(f(b)) = y$

$g(f(c))$

$g \circ f$

Functions



Functions

$f(x) : x+1$ $\quad g(x) : 2x+3$

$f(a) = 2a+1$

$gof = g(f(x))$

$= g(x+1)$

$= 2(x+1)+3$

$2x+2+3 = 2x+5$

$fog = f(g(x))$

$= f(2x+3)$

$= 2x+3+1$

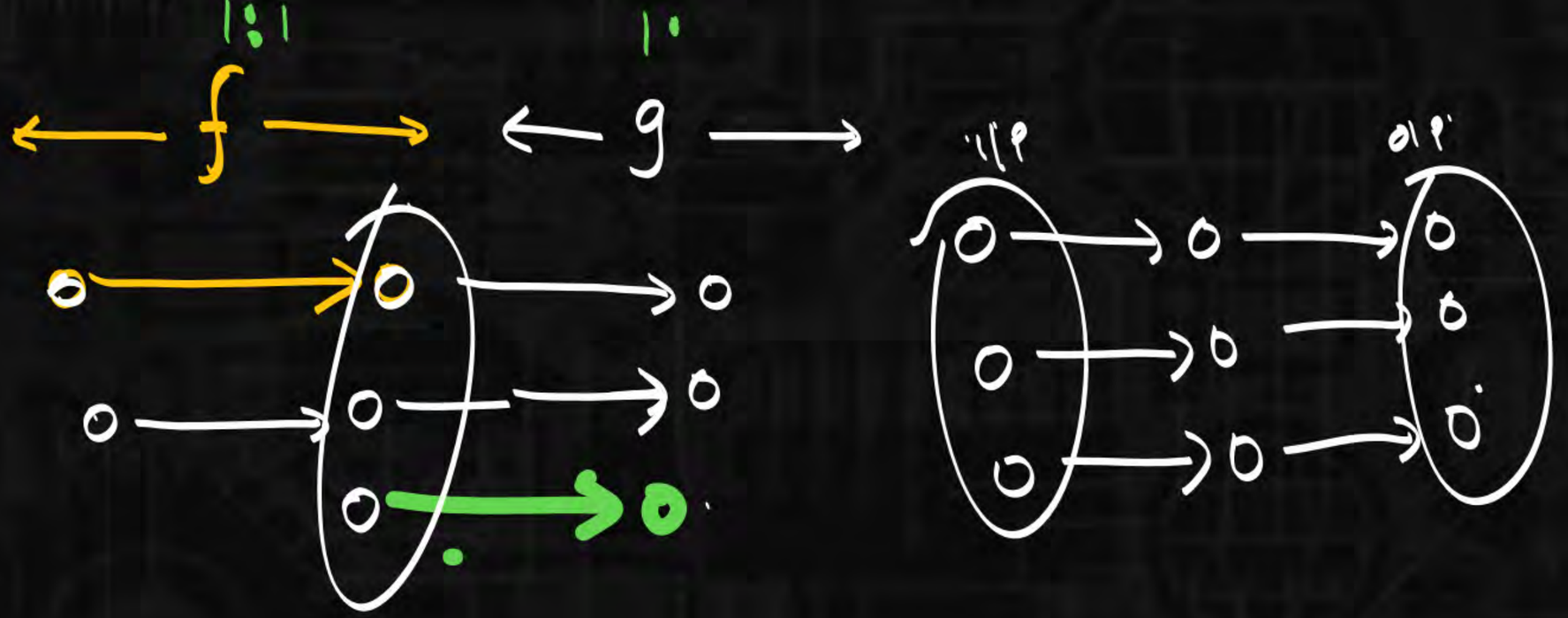
$= 2x+4$

$gof \neq fog$

Functions

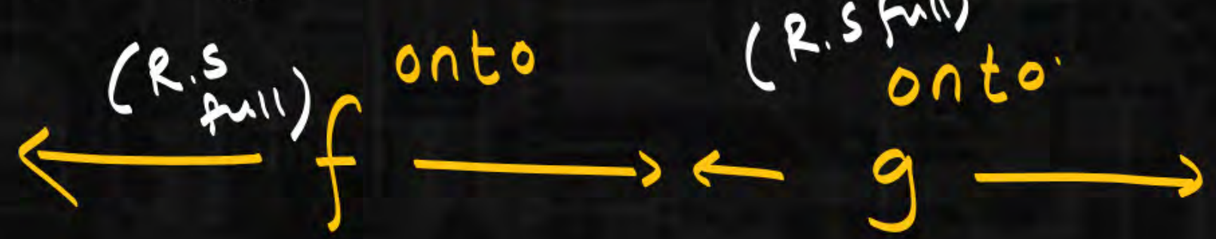
$f: A \to B \quad g: B \to C$

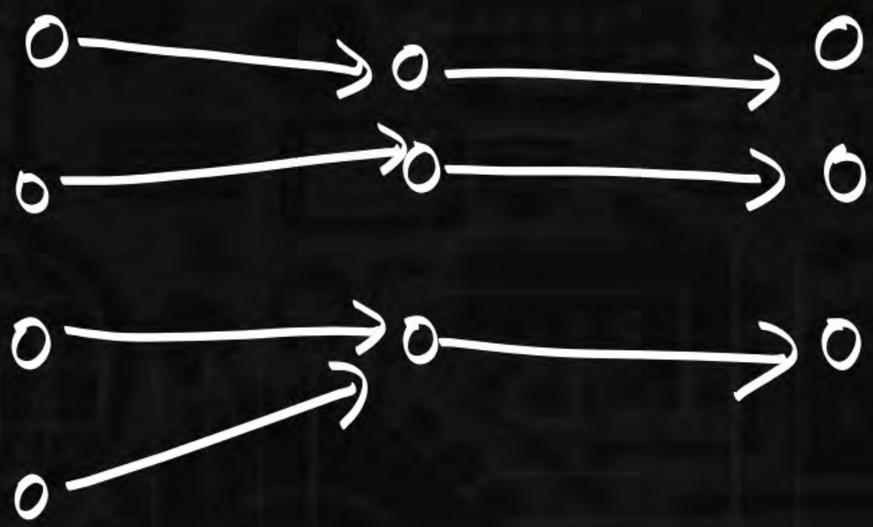
1) if f & g are 1:1 function then gof is also 1:1.



Functions

if f & g are onto then gof is onto. (True) ✓





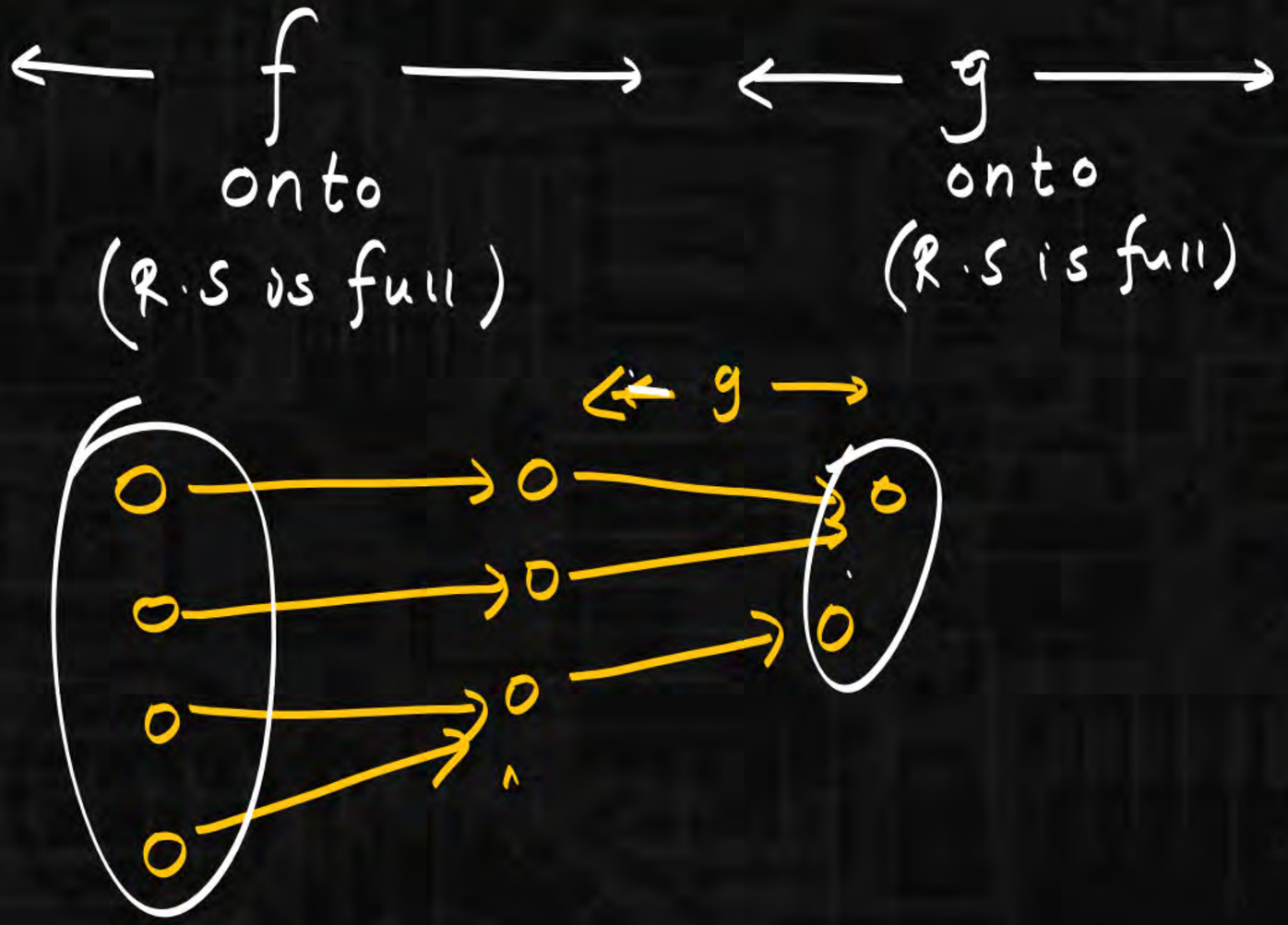
Functions

1) if f & g are 1:1 then gof is 1:1. ✓

2) if f & g are onto then gof is onto ✓

3) if f & g 1:1c then gof is 1:1c. ✓

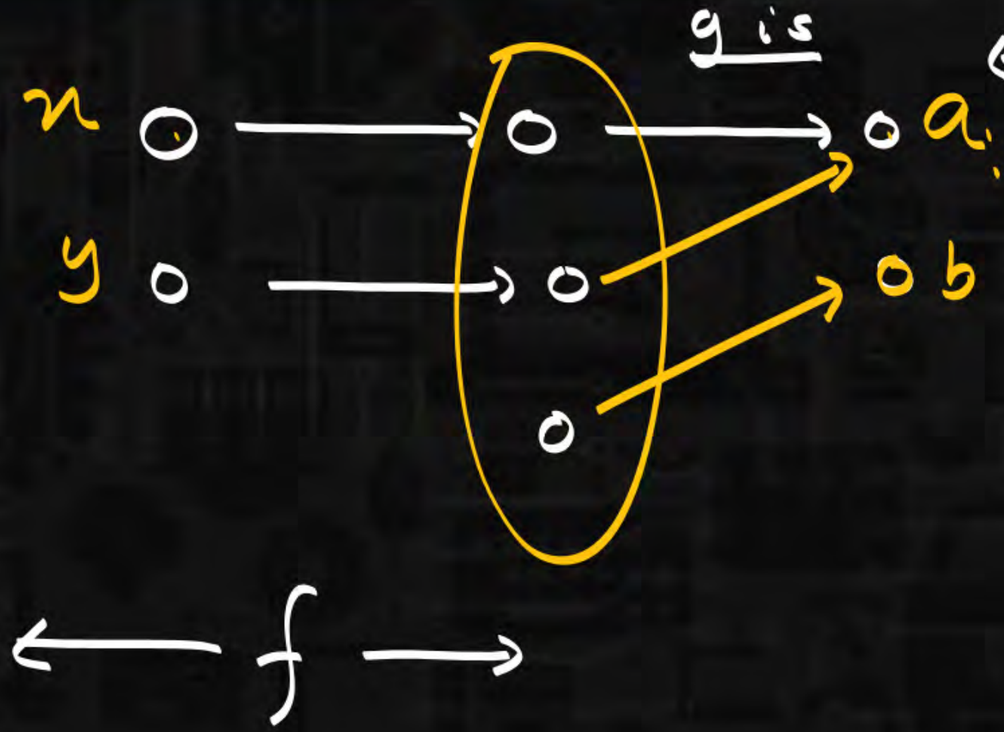
Functions



if f, g are onto then gof is onto.

if g is onto
then gof is onto.

Functions



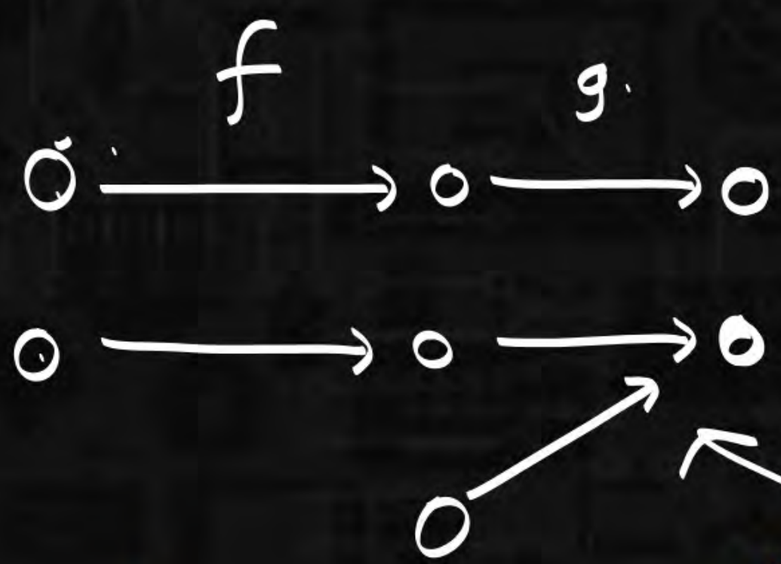
g : onto → gof is onto.
(false)

if f, g are onto then gof is onto.

Functions

gof is onto ⟶ g is onto
(True)

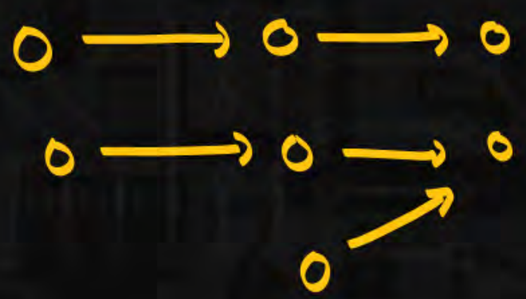
g: onto
⟶ gof is onto
false.



gof is onto then f is onto (false)

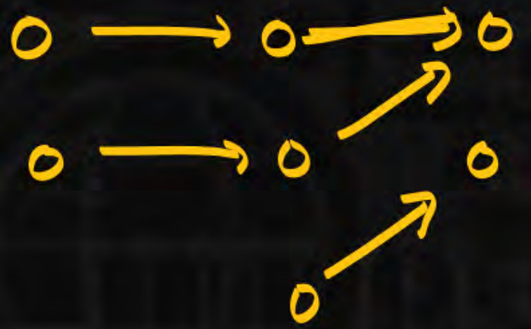
Functions

gof is onto then g is onto (True)



gof is onto then f is onto (false)

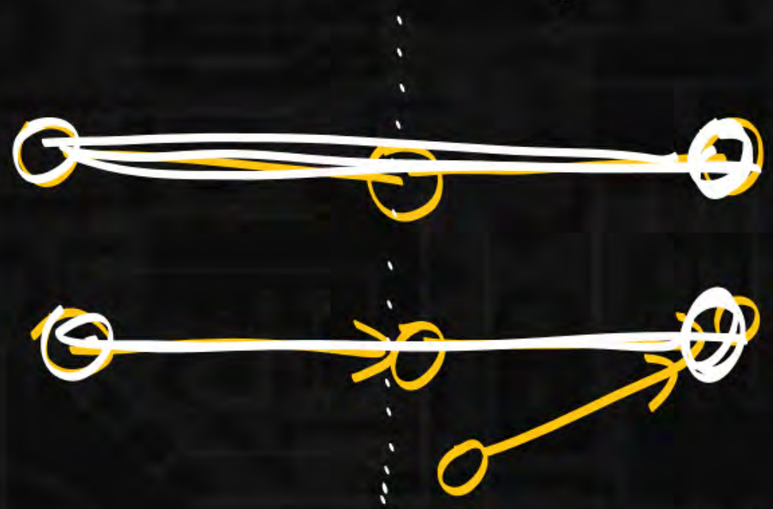
g is onto → gof is onto (false)



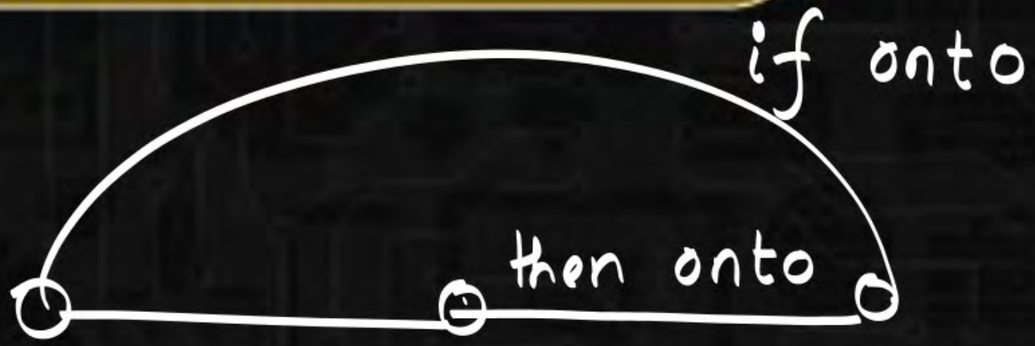
Functions

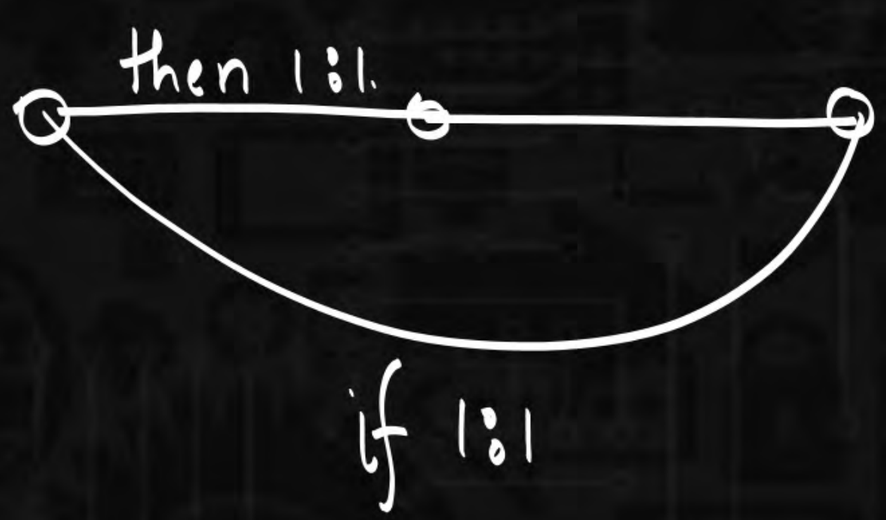
gof is 1:1 then g is 1:1 (false)

gof is 1:1 then f is 1:1 (True)



Functions





Functions

$h(a) = g(f(a))$

g is onto $\rightarrow$ h is onto.

h is onto $\rightarrow$ f is onto.

h is onto $\rightarrow$ g is onto.

h is onto $\rightarrow$ f & g are onto.


THANK YOU GW
SOLDIERS !