

# Set Theory Revision Part II

Special class

# SATISH KUMAR YADAV



**BE (Information Technology)  
in 2012**



## **GATE/ESE:**

- 8+ Years of Teaching Experience
- Ex - ACE ACADEMY Faculty
- Submitted Many Research Paper
- 3+ Years Corporate Research Experience



**Subjects Taken:**  
Discrete maths / DBMS

**BABA20**

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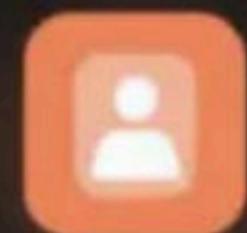
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### Study Booster Sessions

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# ICONIC



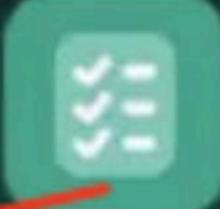
## PLUS



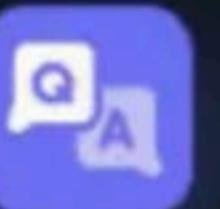
RIB



Crash Courses



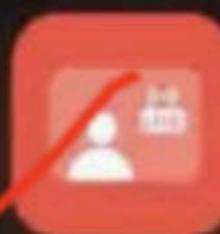
Weekly Tests



Doubt Solving



English & Hindi



Live Classes



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**GATE & ESE**

**PLUS**  **ICONIC**

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SAVE 61%  
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PLUS  ICONIC 

6  
MONTHS

Not available  
with ICONIC

12  
MONTHS

SAVE 32%

₹3,375/mo

24  
MONTH

SAVE 55%

₹2,250/mo

 No cost EMI available on 6 months ... >

**BABA20**

₹40,500

for 12 months

Proceed to  
payment

## GATE & ESE

PLUS  ICONIC 

12  
MONTHS

SAVE 32%

₹3,375/mo

24  
MONTHS

SAVE 55%

₹2,250/mo

 No cost EMI available on 6 months ... >

**BABA20**

₹54,000

for 24 months

Proceed to  
payment

DPP - DM (1-28)



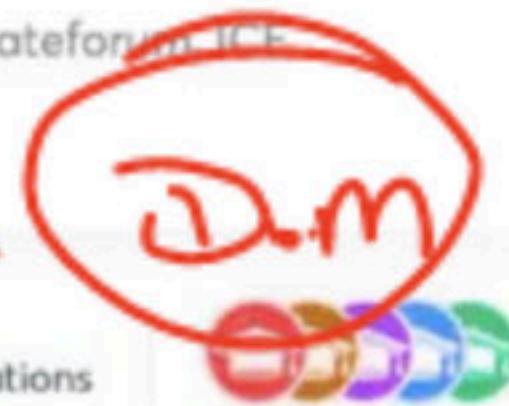
Satish Yadav

Teaches in GATE & ESE

# Researcher Kahlo # 8+ years of experience in teaching  
gate , VISION GATE # submitted many research paper

free practice

Questions



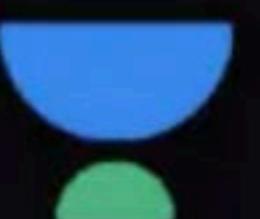
133 Dedications

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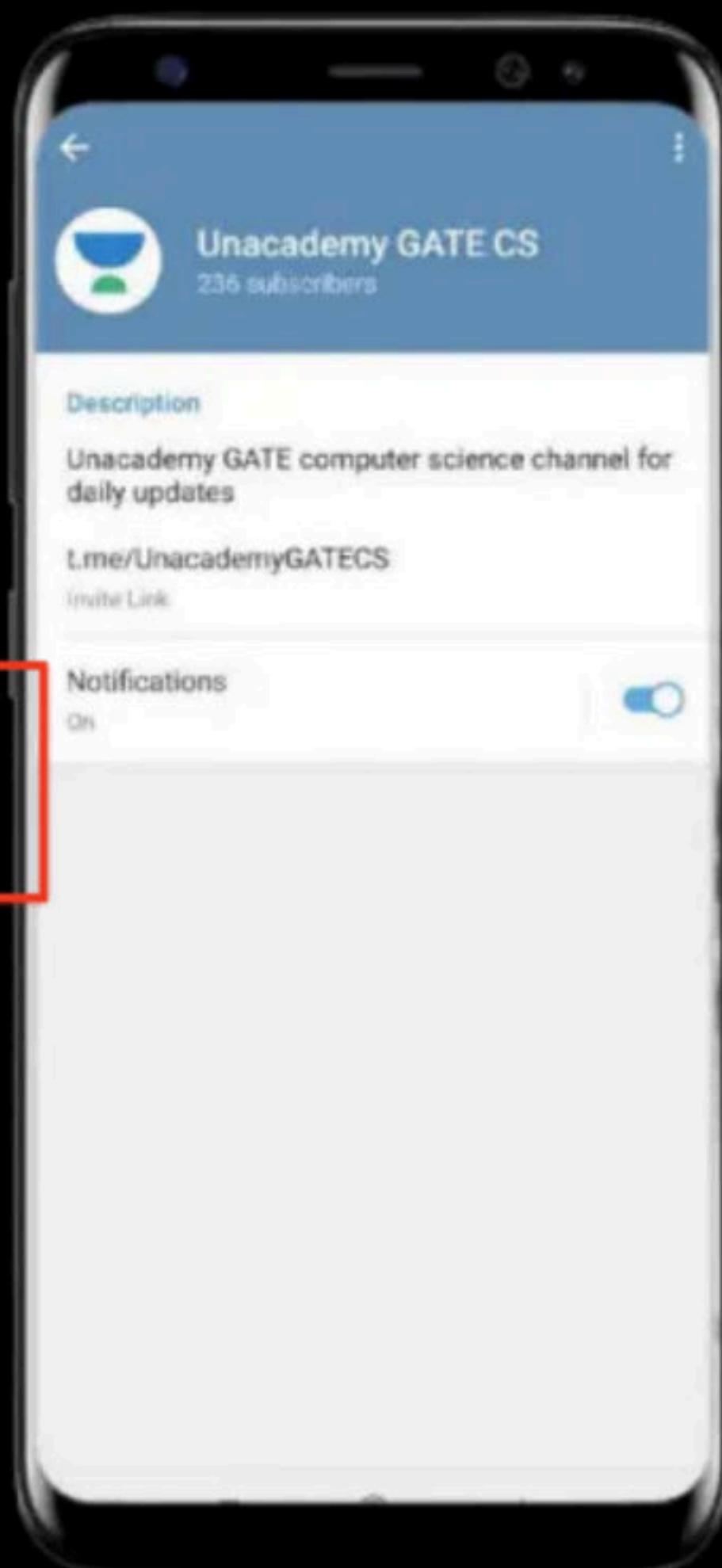
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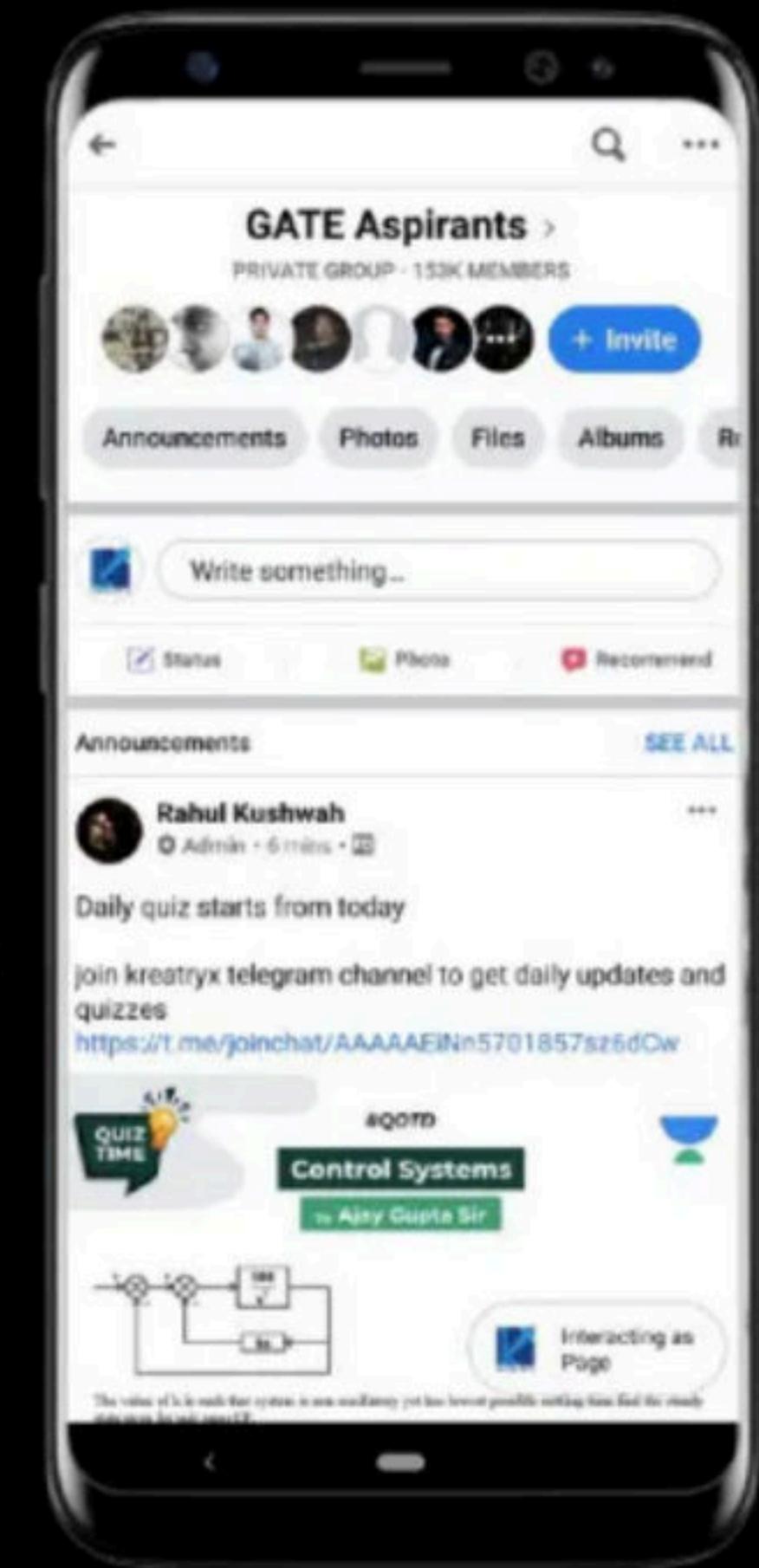
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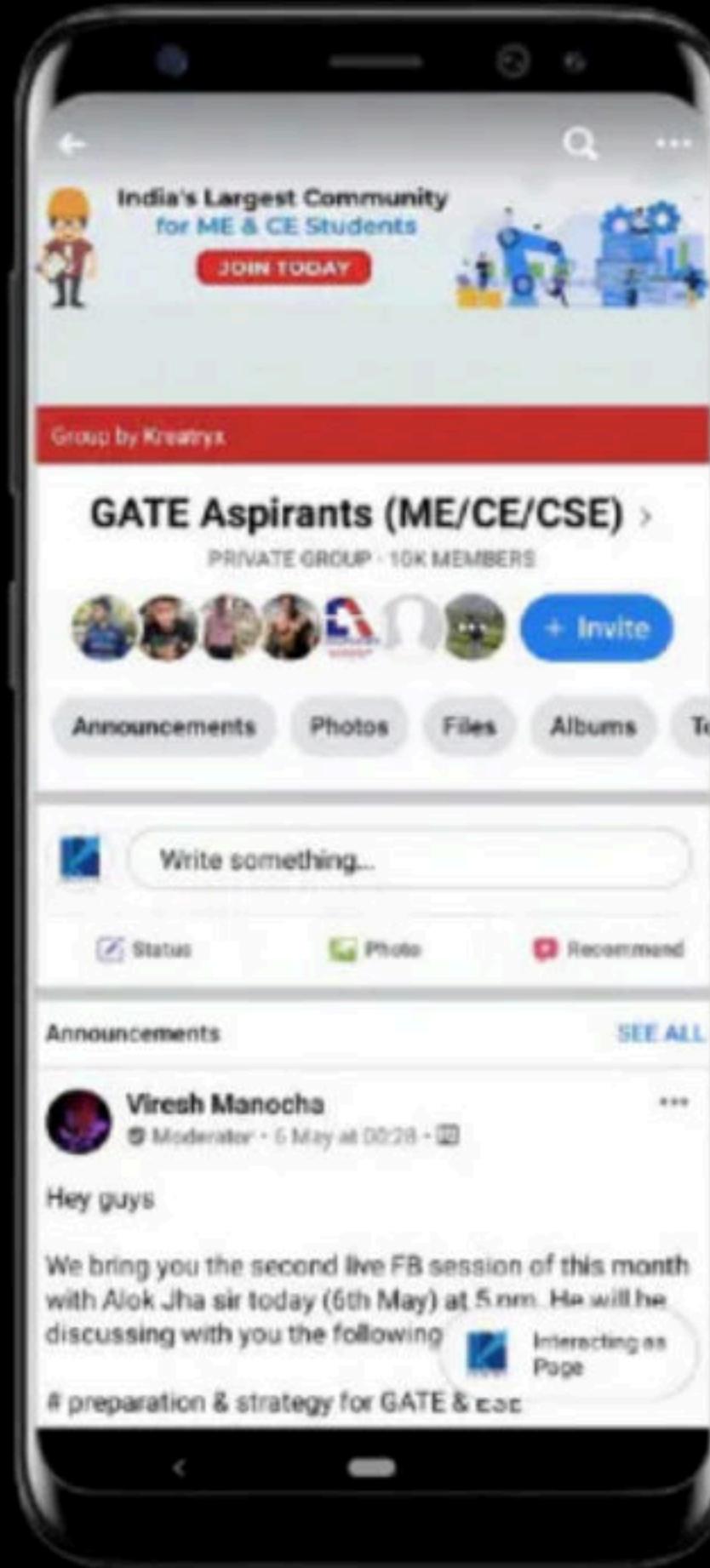
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**GATE Aspirants**  
**150K+** Members



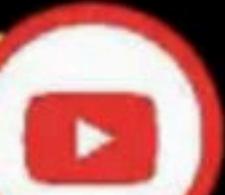
**GATE Aspirants (ME,CE,CSE)**  
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# India's No. 1 Study Channels

Kreatryx GATE  
EE,ECE,IN



Unacademy GATE  
ME,PI,XE



Unacademy  
GATE CE



Unacademy  
GATE Telugu



Unacademy  
SSC JE



Unacademy  
Computer Science



Unacademy GATE  
Questions



Electrical  
Junction



Engineering  
Pathshala



GS Terminal -  
RRB, SSC



Composition.

Transitive  
closure.

Anti/A sy.

Transitive

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



# Composition of function

$f: A \rightarrow B$

$g: B \rightarrow C.$

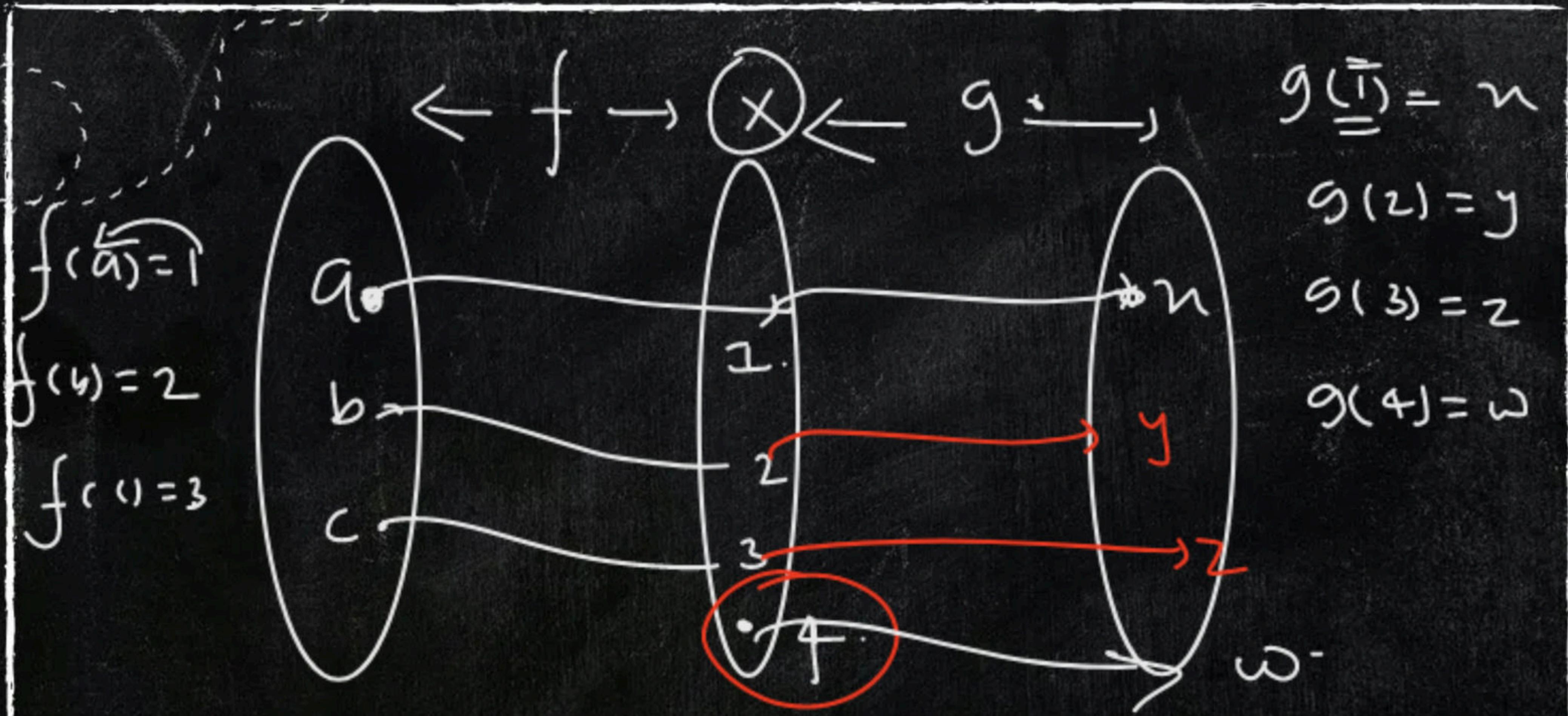
$\therefore A \rightarrow C.$

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on





USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



$$g(1) = n$$

$$f(u) = \underline{1}$$

$$\underline{\underline{g(f(a))} = n.}$$

$$g(f(x)) = \underline{\underline{\quad}}$$

g.f

gof

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



$f : A \rightarrow B$

$g : B \rightarrow C$

$\underline{g \circ f}$

$\underline{\underline{g(f)}}$

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



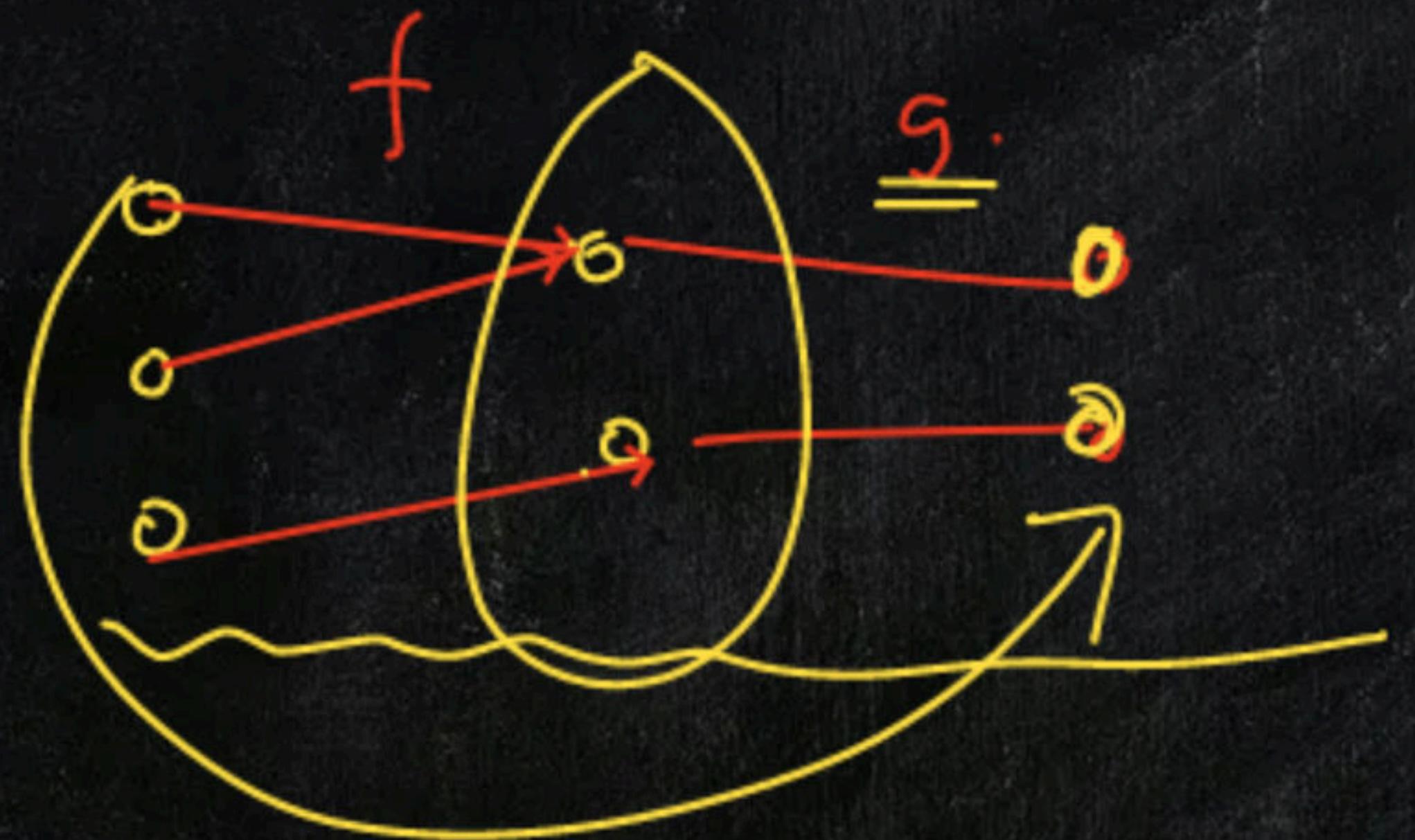
$\rightarrow$  If  $f$  &  $g$  are  $1:1$  then  $gof$   
is  $1:1$   
function.

$\rightarrow$  If  $f$  &  $g$  are onto then  $gof$

$\rightarrow$  If  $f$

f & g gave onto then gof.

is onto.



USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



$f \cdot g$  gave  $1:1$  then  $g \circ f$  is

also  $1:1$ .



$g \circ f$

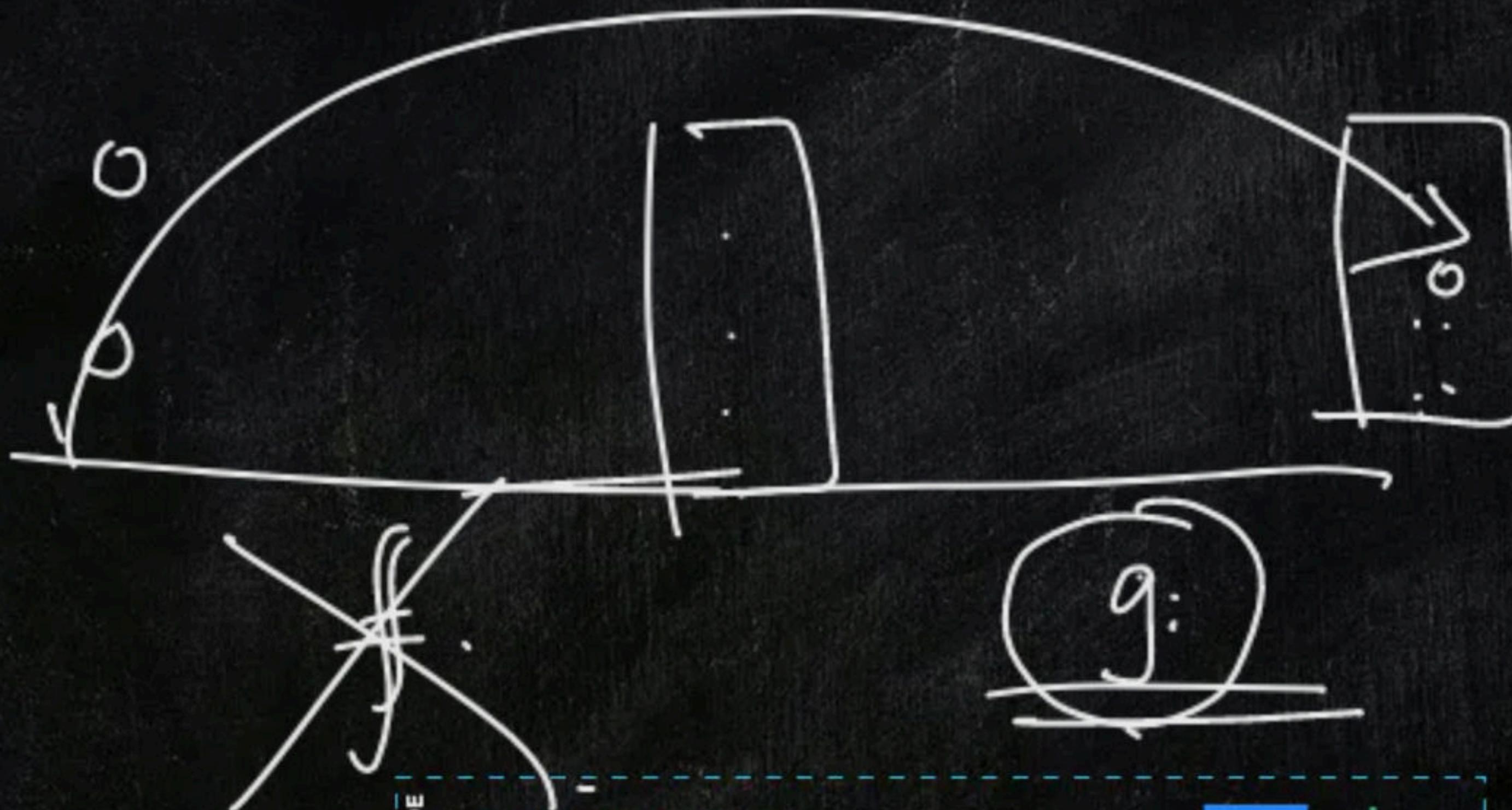
USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



flag onto then sof onto.



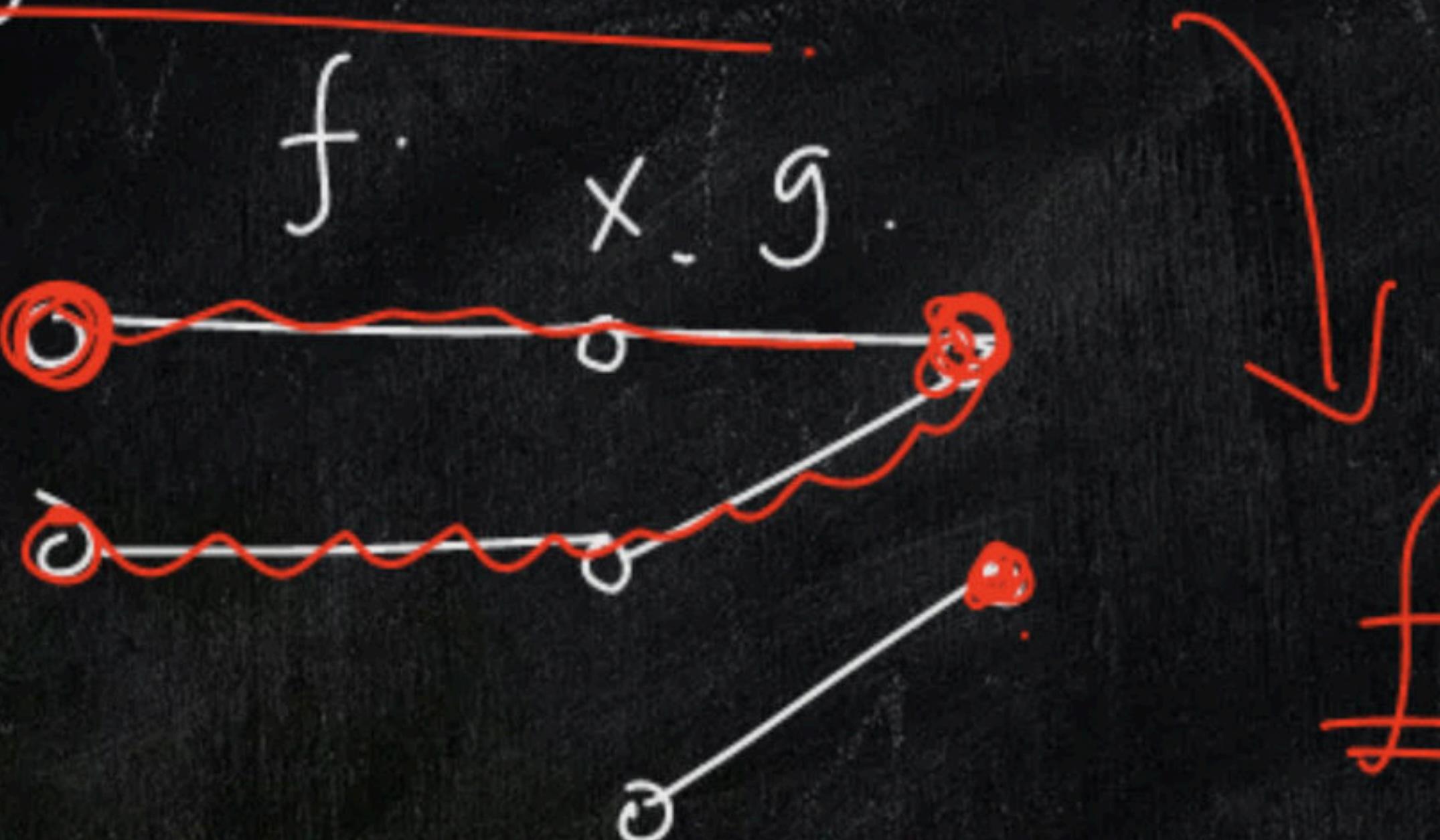
USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



If  $g$  is onto then  $g \circ f$  is onto.



false

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



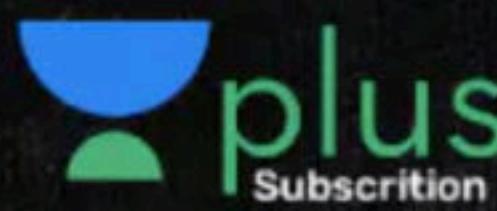
o → o → o

o → o → o

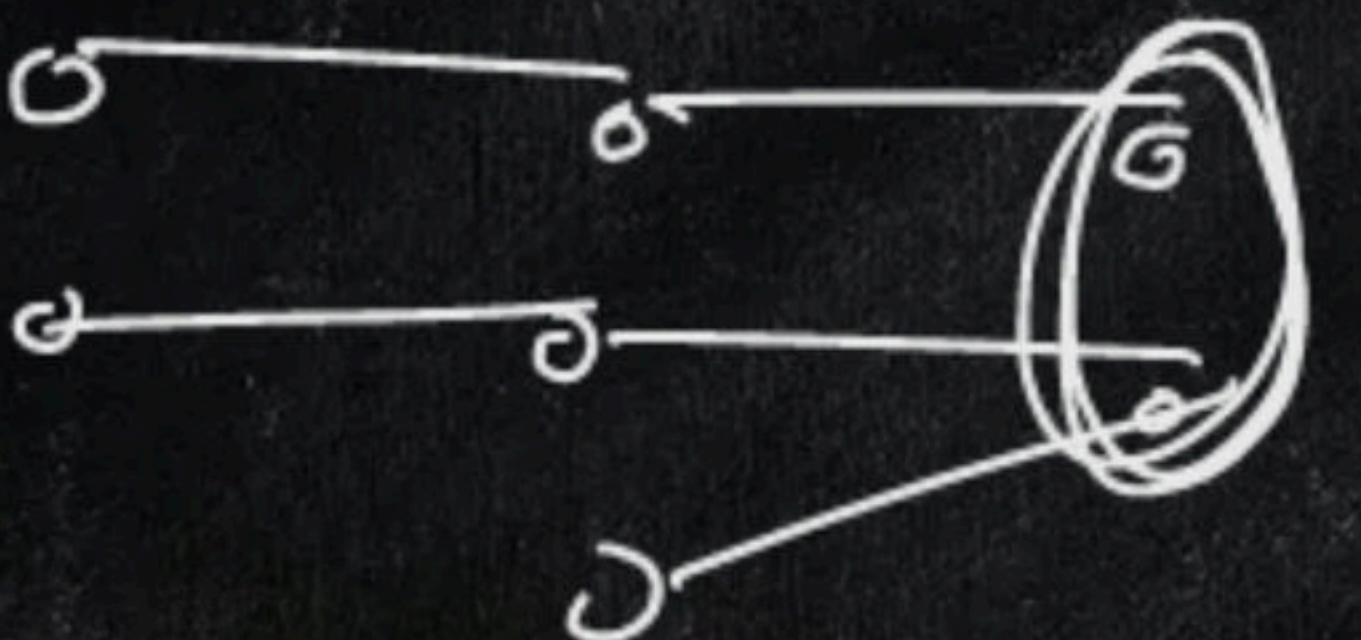
USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on

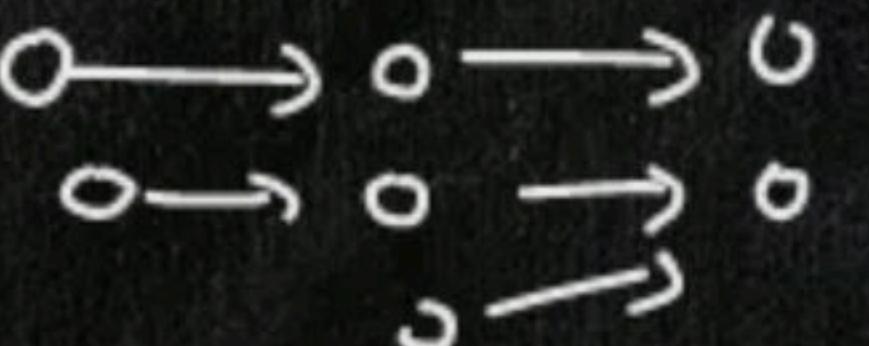


If  $g \circ f$  is onto then  $g$  is onto



True

If  $g \circ f$  is onto then  $f$  is onto.



(false)

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



then onto

if onto

A

X

B

Y

C

Z

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



If  $g \circ f$  is  $1:1$  then  $f$  is  $1:1$ .



If  $g \circ f$  is  $1:1$  then  $g$  is  $1:1$ .



USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on



then

1 : 1



if 1 : 1

then onto



if onto

USE CODE

**BABA20**

TO GET  
MAX DISCOUNT on





Thank You



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Transitive Relation .

$$R = \{ (1, 2) |$$

.....

forall  $a, b, c$   $a R b \wedge b R c \rightarrow a R c.$

Transitive

OR.

forall  $a, b, c$ .  $(a, b) \in R \wedge (b, c) \in R \rightarrow (a, c) \in R.$

$(1, 2) \in R \wedge F:$   $\rightarrow$

{  $F \rightarrow$  } T.

$$R = \{ (a, b) \mid a + b \leq 3 \}.$$

T. f.

$$\underline{a R b} \wedge \underline{b R c} \rightarrow \underline{a R c}.$$

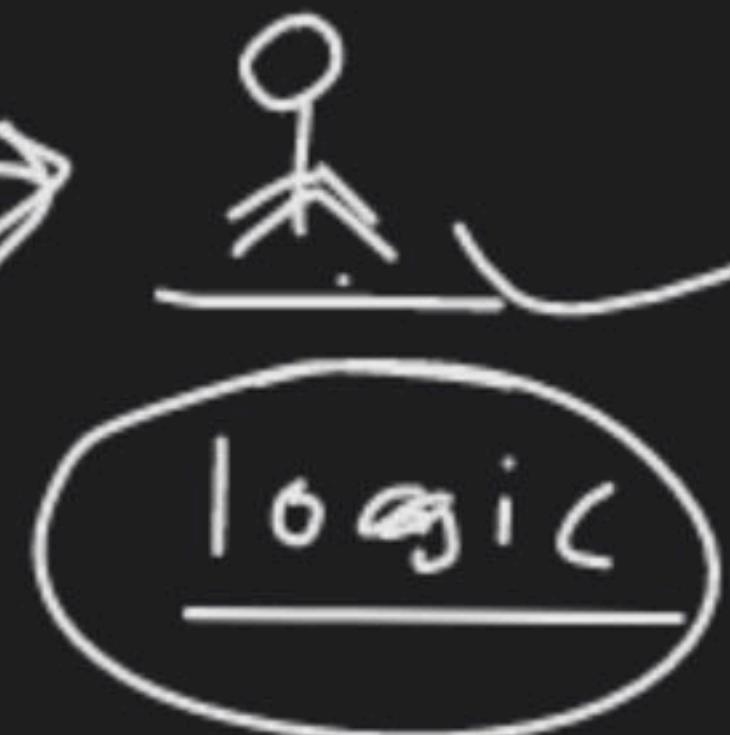
$$a + b \leq 3 \wedge b + c \leq 3 \rightarrow a + c \leq 3.$$

$$(1, 0) \in R \wedge (0, 2) \in R$$

$$1+0 \leq 3 \wedge 0+2 \leq 3 \rightarrow 1+2 \leq 3.$$

$$\underline{2+1 \leq 3} \wedge \underline{1+2 \leq 3} \rightarrow \boxed{2+2 \leq 3}.$$

Logic.



100

Anti:

$$aRb \wedge bRa \rightarrow a = b.$$

OR.

$$(a,b) \in R \wedge (\underline{b,a}) \in R \rightarrow a = b.$$

$$\underline{(1,2) \in R \wedge f.} \rightarrow$$

$$f. \rightarrow$$

R

$$R = \{ (1,2) | \checkmark \}$$

True.

$$R_2 = \{ (\underline{1}, \underline{2}), (\underline{2}, \underline{1}) \}.$$

$$(a, b) \in R \wedge (b, c) \in R \rightarrow a = b.$$

$$(\underline{1}, \underline{2}) \in R \wedge (\underline{2}, \underline{1}) \in R \rightarrow 1 = 2$$

T.

f.

$\{ (1, 2) \} \checkmark$

$\{ (2, 1) \} \checkmark$

$$\frac{a R b \wedge b R a}{\neg a = b}$$

$\{ (\underline{1}, \underline{2}) (\underline{2}, \underline{1}) \}$

$\{ (1, 1) \}$

$$|R| \wedge |R| \rightarrow \underline{\underline{|=|}}$$

Asy: (1,2)

$aRb \rightarrow bRa$  (2,1)

(1,1)

$\{ (12)(21) \}$

$\frac{1R1}{T} \rightarrow \frac{1R1}{F}$ .

Anti

$$aRb \wedge Ra \rightarrow a = b.$$

→ Does not allow  
flipping

→ allows same  
element.

Asy.

$$aRb \rightarrow bRa.$$

→ Does not allow  
flipping.

→ Does not allow  
same element.

~~(1,2)~~ ~~(2,1)~~ ~~(1,1)~~ ~~(2,2)~~

~~(a,b)~~ ~~(b,a)~~ ~~(a,a)~~ ~~(b,b)~~

$\frac{\{(a,b) \quad (b,c)\}}{(a,c)}$

$$aRb \wedge bRc \rightarrow aRc. \quad \left\{ \begin{array}{l} (1,2) (2,1) \cancel{(1,1)} \\ \cancel{(2,2)} \end{array} \right]$$

$$1R2 \wedge 2R1 \rightarrow 1R1 \times.$$

$$2R1 \wedge 1R2 \rightarrow 2R2 \times$$

$$(1,3) (3,4) (1,4)$$

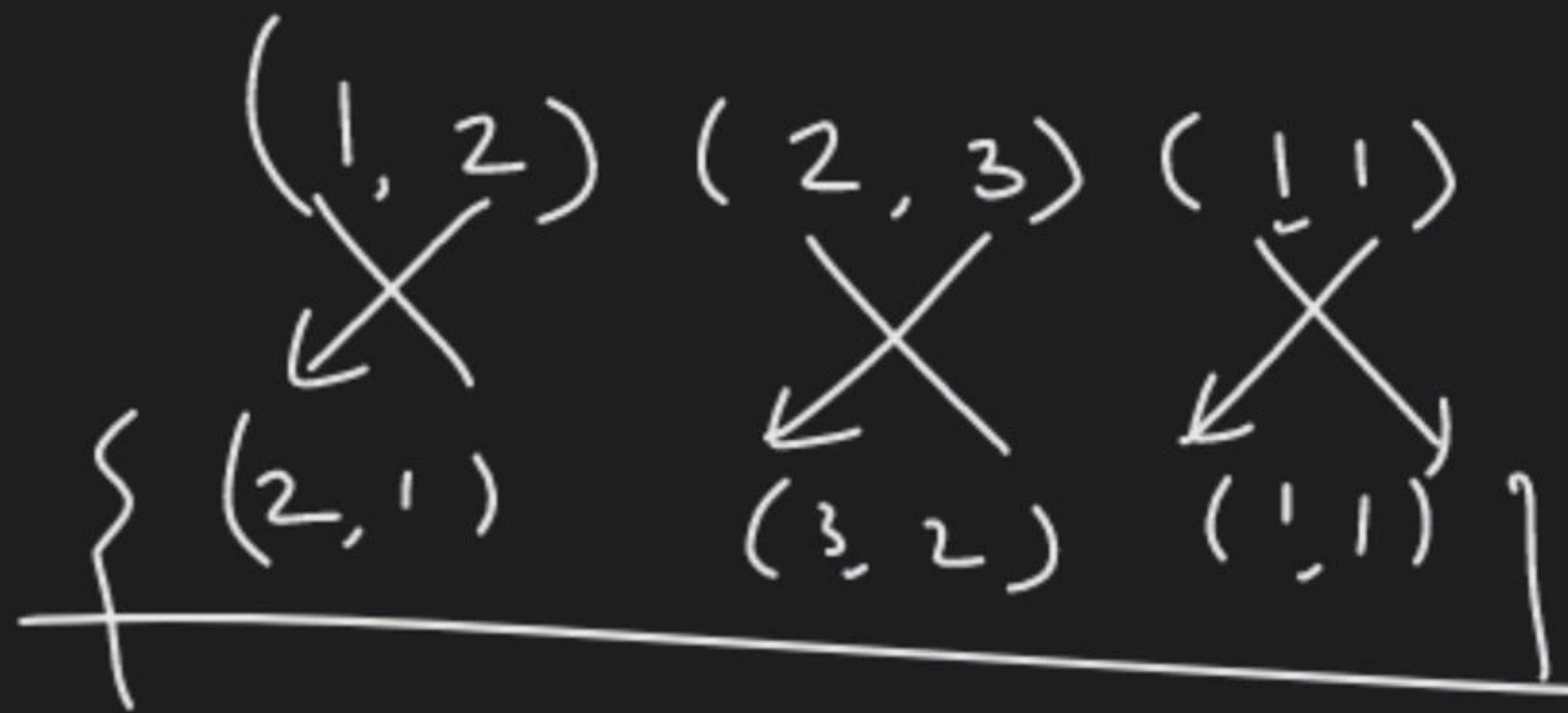
$$(2,3) (3,2)$$

$$(3,4)$$

a|b →  
b|a.

$$R = \{ (a, b) \}$$

$$\overline{R}^T = \{ (b, a) \}$$



$$\Rightarrow \overline{R} = A \times A - R$$

$$\rightarrow R^{-1} = \left\{ (b, a) \mid (a, b) \in R \right\}$$

$$\overline{A} = U - A.$$