Nook 11 ASSESSED CONVERNORE 2 datina 11 am to be submitted via * amplis* · A Mack exam paper $\longrightarrow \boxed{2} \times + \boxed{2}$

3 Permutations Det let & be a set. A permutation at S is a finction f: S -> S' Which is bijection. inpetive & Surpetive. simn SES, f(+)= f(5) r, 2 ∈ 5 Have exids r ES S,t, f(r) = S? +6n r=8

Fix N21. Det the set of parametations of S={1,---, n3 is denuted by sh. and every element of Sn is written $45 \left(\frac{1}{1} 2 3 - \cdots \right)$ $45 \left(\frac{1}{11} 412 + \frac{1}{13} \right) - \cdots + \frac{1}{11} \left(\frac{1}{11} \right)$ RE Sina F is bijective. $\{1, \dots, n\} = \{+(1), \dots, +(n)\}$ Example M=8 (12345678) f = (47381526) f is a bijection a reskering of 1, 1, 8 $\{21, ..., 83 \rightarrow \{1, ..., 8\}$ Sending 1 1 4 2 +77 3 173 θ 1 $7 \mapsto 2$

RE It's thre to see otherwise but He first row does Not have to be in the order 1,2.3, ---(12345678) (235(8674) (47381526) (73146528)because they contain to same set it information, Prop36 $|S_n| = m!$ Pt Follows by definition

Physical Sym(
$$21, \dots, n3$$
)

The sym($21, \dots, n3$)

The sym($21, \dots,$

Hop31 If find 9 are elements Hon fog is also an element A We need to check that in Sh. 69 is bijetive on 81,1,1,13 injectivity Need to check: $x, y \in \{1, -, n\}$ (6)(4) = (409)(9)Her x = 9

To do this, assume (+05)(x) = (+09)(9)f(g(x)) + (g(y))Sino f is injective. $\mathcal{O}(\mathbf{x}) = \mathcal{O}(\mathcal{G})$ Since 9 is injective, $\chi = 0$ Surjectivity Next to check:

Siven
$$2 \in \{1, \dots, n\}$$
,

the exists $x \in \{1, \dots, n\}$,

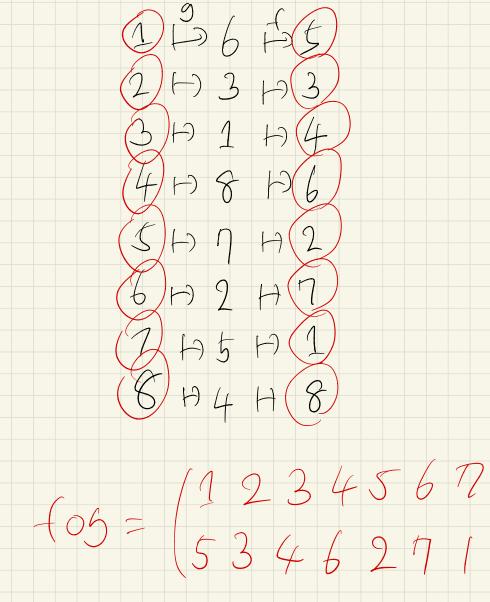
\$t. $(f \circ g)(x) = 2$.

Example $n = 8$

$$f \circ (4 7 3 8 1 5 2 6)$$

$$f \circ (4 7 3 8 1 5 2 6)$$

$$f \circ (6 3 1 8 7 2 5 4)$$



Prop 38 If I is an element a Single Hon to inverse for exists

Ref
$$f^{-1}$$
 is the function g

Set. $f \circ g = g \circ f = 1$.

(123...n)

Proof Define $g : \{1, \dots, n\} \rightarrow \{1, \dots, n\}$

as follows.

Given $y \in \{2, \dots, n\}$
 $g(g) = f(g) = f(g)$

The image element x
 $g(g) = f(g) = f(g)$
 $g(g) = f(g)$

in Sa

g.t. f(x) = y. X exists because f is surjective X is un she becase f's injetive. Than check 9 îs also bijective. +09 = 190 f = 1.

Example
$$f = (12345678)$$

 $f = (47381526)$
 $f = (1)$ is the migra element
 $f = (1)$ is the

$$f^{-1}(2)$$
 if $x \in \S1, \dots, \S3$
 $9t \cdot f(x) = 2$
That 5
 $2 + 7$
 $3 + 3$
 $4 + 3 + 1$
 $5 + 3$
 $6 + 3$
 $7 + 3$
 $8 + 3 + 4$