

MTH 4104 Example Sheet V

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V-1. Let $g = (1\ 5\ 6\ 10\ 4\ 9)(2\ 8\ 11\ 3)$ and $h = (1\ 10\ 3\ 9\ 7\ 6\ 11)(2\ 8)(4\ 5)$ be permutations in S_{11} . (a) Write g in the 2-by-11 'matrix' form. (b) Calculate $h^{-1}, g \circ h, h^{-1} \circ g \circ h$. (c) What is the order of g ? What is the order of $h^{-1} \circ g \circ h$? Explain how and why these two numbers are related.

V-2. Does S_8 contain (a) a permutation of order 14? (b) a permutation of order 15? (c) a permutation of order 16? Explain why.

V-3. Let the group operation $*$ on a set $G = \{a, b, c, d\}$ be given by the following table:

$*$	e	a	b	c	d
e	e	a	b	c	d
a	a	e	d	b	c
b	b	c	e	d	a
c	c	d	a	e	b
d	d	b	c	a	e

Is $(G, *)$ a group?

V-4. Let G be the set of integers with the operation $*$ defined by $x * y = x + y + 1$. Prove that $(G, *)$ is a group.