PERMUTATIONS EXAMPLES

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Consider the following permutations:

$$a = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \\ 9 & 11 & 7 & 8 & 10 & 2 & 1 & 5 & 3 & 4 & 6 \end{pmatrix}$$

and

$$b = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \\ 7 & 6 & 3 & 10 & 2 & 11 & 1 & 5 & 4 & 9 & 8 \end{pmatrix}$$

When written as as a product of cycles, we have

$$a = (1, 9, 3, 7)\,(2, 11, 6)\,(4, 8, 5, 10)$$

and

$$b = (1, 7)\,(2, 6, 11, 8, 5)\,(3)\,(4, 10, 9) = (1, 7)\,(2, 6, 11, 8, 5)\,(4, 10, 9)$$

The inverse a^{-1} is:

$$a^{-1} = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 \\ 7 & 6 & 9 & 10 & 8 & 11 & 3 & 4 & 1 & 5 & 2 \end{pmatrix}$$

$$= (7, 3, 9, 1)\,(6, 11, 2)\,(10, 5, 8, 4)$$

Moreover the product ab of a and b is:

$$ab = [(1, 9, 3, 7)\,(2, 11, 6)\,(4, 8, 5, 10)] \cdot [(1, 7)\,(2, 6, 11, 8, 5)\,(4, 10, 9)]$$

$$= (1)\,(2)\,(3, 7, 9, 8, 10)\,(4)\,(5, 11)\,(6) = (3, 7, 9, 8, 10)\,(5, 11)$$

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