

Mathematics for Science

Assignment 11

Permutation functions

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Instructions: Attempt all the Questions

1) Given  $p_1 = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$ ,  $p_2 = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$ ,  $p_3 = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 1 & 2 \end{pmatrix}$ ,  $p_4 = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ ,

$p_5 = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 4 & 1 \end{pmatrix}$  work out;

a)  $p_4^{-1}$

c)  $p_3^{-1}$

e)  $p_3 \circ p_2 \circ p_4^{-1}$

b)  $p_2^{-1}$

d)  $p_4 \circ p_3 \circ p_1$

f)  $p_3 \circ p_5 \circ p_1$

2) Write the following permutations in cycle notations

a)  $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 2 & 4 & 5 & 3 \end{pmatrix}$

c)  $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 1 & 4 & 3 & 2 \end{pmatrix}$

b)  $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 5 & 3 & 1 & 2 \end{pmatrix}$

d)  $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 3 & 2 & 5 & 4 & 1 \end{pmatrix}$

3) Compute each of the following;

a)  $(125)(254)$

c)  $(153)(53)(241)$

b)  $(142)(123)$

d)  $(3254)(43)(15)$

4) Express the following as product of transpositions

a)  $(234)(125)(367)$

b)  $(235)(189)(256)(2675)$