$\begin{array}{c} \mathbf{M} \ \mathbf{E} \ \mathbf{T} \ \mathbf{U} \\ \mathbf{Department} \ \mathbf{of} \ \mathbf{Mathematics} \end{array}$

		Basic Algebra	
		MidTerm II	
Code	: Math 116	Last Name :	
	: 2013-2014	Name : Student No) :
Semester Instructor	: G.E., T.K., M.K., A.S	Department:	
Instituctor		Signature :	
Date	: 06.05.2014	6 Questions on 4 Pages	
Time	: 17.40	Total 60 Points	
Duration	: 100 minutes	Total 60 Tollics	
	3 4 5 6		

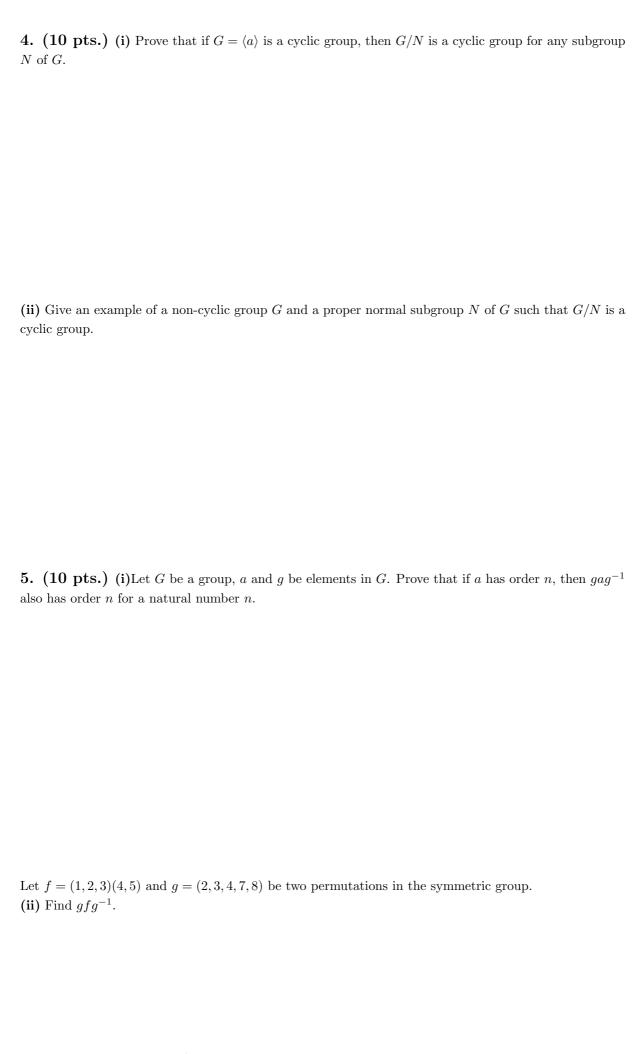
1.(10 pts.) Let f = (1, 2, 4, 3) and g = (1, 3, 5, 2) be permutations.

(i) Write the product fg as a product of disjoint cycles.

(ii) Write fg in as a product of transpositions.

(iii) Is fg an odd permutation or an even permutation? Give reason.

2.(10 pts.) Suppose that G is a group and K,N are normal subgroups of G . (i) Show that $KN = \{kn k \in K, n \in N \}$ is a subgroup of G .	7.
(ii) Show that KN is a normal subgroup of G .	
(ii) Show that N is a normal subgroup of O.	
3. (10 pts.) If K and N are normal subgroups of G such that $ G/N =5$ at that $x^{15}\in K\cap N$ for all $x\in G$.	and $ G/K = 3$, then show



6. (10 pts.) (a) Let $G = \{ \begin{pmatrix} a & 0 \\ 0 & a \end{pmatrix} | a \in \mathbb{R}, a \neq 0 \}$ be a group of 2×2 matrices under matrix multiplication. Show that G is isomorphic to the group $\mathbb{R} - \{0\}$ (non-zero real numbers) under multiplication of numbers.

(b) Let $H = \{ \begin{pmatrix} b & 0 \\ 0 & b \end{pmatrix} | b \in \mathbb{Q}, b \neq 0 \}$ be the subgroup of G isomorphic to the multiplicative group of nonzero rationals.

Is H a normal subgroup of G? (give reason)

(c) Find the cardinality of G/H. (Give reason)