Abstract Algebra	FINAL EXAM	May 23, 200
Name:	_ R. Hammack	Score:
	estions in the space provided. To get full credit yeting or communication devices is <b>not</b> allowed on	
1. Draw the subgroup lattice for	$\mathbb{Z}_{18}.$	
2. List the elements of the cyclic	c subgroup $\langle -\mathrm{i} \rangle$ of $\mathbb{C}^*$ .	

4.	Consider	the set	$H = \frac{1}{2}$	$\{\sigma \in S_5\}$	$\sigma(3)$	=3	}.
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(a) 
$$|H| =$$

(b) Explain why  $\ H$  is a subgroup of  $S_5$ .

(c) Is H a normal subgroup of  $S_5$ ? Explain.

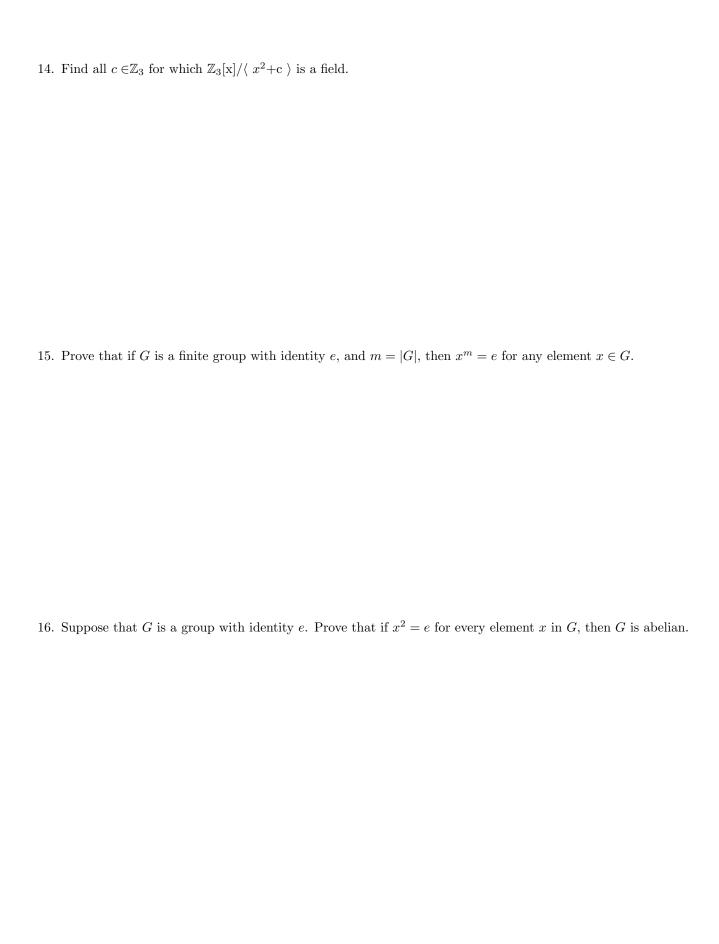
(d) How many left cosets of H are there in  $S_5$ ?

5. List all the nonisomorphic groups of order 180.

6. Find the order of (3,6,9) in  $\mathbb{Z}_4 \times \mathbb{Z}_{12} \times \mathbb{Z}_{15}$ .

Are the groups	$\mathbb{Z}_8{ imes}\mathbb{Z}_{10}{ imes}\mathbb{Z}_3$ and	$\mathbb{Z}_8{\times}\mathbb{Z}_2{\times}\mathbb{Z}_{15}$ iso	omorphic? Wł	ny or why not?
Find the kernel of	of the homomorp	hism $\phi: \mathbb{Z} { ightarrow} \mathbb{Z}_8$ fo	or which $\phi(1)$ =	=6.
Find the kernel of	of the homomorp	hism $\phi: \mathbb{Z}_{40} { ightarrow} \mathbb{Z}_5$	$ imes \mathbb{Z}_8$ for which	$\phi(1) = (1,4).$
	Find the kernel of  (a) List the unit  (b) List the zero	Find the kernel of the homomorphic find the kernel of the homomorphic (a) List the units in the ring $\mathbb{Z}_{12}$ (b) List the zero divisors in the	Find the kernel of the homomorphism $\phi: \mathbb{Z} \to \mathbb{Z}_8$ for	(b) List the zero divisors in the ring $\mathbb{Z}_{12}$ .





17. Prove that if G is an abelian group, then the set of all elements $x \in G$ for which $x^2 = e$ form a subgroup of G.
18. Prove that the units of a ring with unity form a multiplicative group.