



Staple!

Ord: _____

Abstract Algebra **Class-C** Prof. JLF King
MAS4301 3175 Monday, 31Mar2008

C-Home: _____ 275pts

C3: _____ 95pts

C4: _____ 40pts

Total: _____ 410pts

Hello. Write **DNE** if the object does not exist or the operation cannot be performed. NB: $\mathbf{DNE} \neq \{\} \neq 0 \neq \text{Empty-word.}$

Let F and R be the *flip* and *rotation* in the dihedral group \mathbb{D}_N , with $F^2=e$, $R^N=e$ and $RFR=e$. Use R^j and R^jF as the standard form of each element in \mathbb{D}_N .

C3: Show no work.

a A finite group G acts on a finite set Ω . Then the number of G -orbits divides $\text{Ord}(G)$: **T** **F**

The cardinality of each G -orbit must divide the $\text{Ord}(G)$: **T** **F**

b Binomial $\binom{6}{2} = \boxed{\dots}$. So a $\lceil 3^6 \rceil$ -perm. $\beta \in \mathbb{S}_{18}$ has $\boxed{\dots}$ many square-roots of $\text{sig} = \lceil 6^1, 3^4 \rceil$. A cube-root of β has signature = $\lceil \boxed{\dots} \rceil$.

c Let $V_K := G \times \mathbb{Z}_5 \times G$, where $G := (\mathbb{Z}_5, +)$. AADPOIntegers, $|\text{Aut}(V_3)| = \boxed{\dots}$.

d $G := \mathbb{Z}_{125} \times \mathbb{Z}_{25}$ has $\boxed{\dots}$ elements of order-5. So G has $\boxed{\dots}$ cyclic subgps of order-5.

e Let $\mathfrak{X}(G)$ be the number of order-6 elts in G . So $\mathfrak{X}(\mathbb{Z}_6 \times \mathbb{Z}_2) = \boxed{\dots}$, $\mathfrak{X}(\mathbb{A}_4) = \boxed{\dots}$, $\mathfrak{X}(\mathbb{D}_6) = \boxed{\dots}$. Now $\mathbb{S}_3 \times \mathbb{Z}_2$ is iso to: **Circle one:** $\mathbb{Z}_6 \times \mathbb{Z}_2$ \mathbb{A}_4 \mathbb{D}_6

Essay question, on your own paper!

Fill-in all blanks.

C4: Recall that $\text{TTT-auts } S := \begin{array}{c} \times \times \\ \times \times \end{array}$ and

$T := \begin{array}{c} \cdot \cdot \cdot \\ | \times | \\ \cdot \cdot \cdot \end{array}$. Draw LARGE 16-dot diagrams of TF

and $\beta := TFR$. Cell-cycle-sig(β) is $\boxed{\dots}$

and $\text{TTT-cycle-sig}(\beta) = \boxed{\dots}$