

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: **DNE** $\neq \{\}$ $\neq 0 \neq$ 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 $RF=FR$. 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 $\binom{6}{2} = \underline{\hspace{2cm}}$. So a $[3^6]$ -perm. $\beta \in \mathbb{S}_{18}$ has $\underline{\hspace{2cm}}$ many square-roots of $\text{sig}=[6^1, 3^4]$.
A *cube-root* of β has signature= $\underline{\hspace{2cm}}$.

c Let $V_K := G \times \overset{K}{\times} G$, where $G := (\mathbb{Z}_5, +)$. AADPOIntegers , $|\text{Aut}(V_3)| = \underline{\hspace{2cm}}$.

d $G := \mathbb{Z}_{125} \times \mathbb{Z}_{25}$ has $\underline{\hspace{2cm}}$ elements of order-5. So G has $\underline{\hspace{2cm}}$ cyclic subgps of order-5.

e Let $\mathcal{X}(G)$ be the number of order-6 elts in G . So $\mathcal{X}(\mathbb{Z}_6 \times \mathbb{Z}_2) = \underline{\hspace{2cm}}$, $\mathcal{X}(\mathbb{A}_4) = \underline{\hspace{2cm}}$, $\mathcal{X}(\mathbb{D}_6) = \underline{\hspace{2cm}}$.
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 III -auts $S := \begin{smallmatrix} \times & \times \\ \times & \times \end{smallmatrix}$ and

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

and $\beta := TFR$. Cell-cycle-sig(β) is $\underline{\hspace{2cm}}$

and III -cycle-sig(β) = $\underline{\hspace{2cm}}$.

HONOR CODE: "I have neither requested nor received help on this exam other than from my professor (or his colleague)."

Name/Signature/Ord

Ord: _____