TMath 402 Section 5

WrittenHW 6

1. [3] What are the possible orders for elements of S_7?
2. Let $\alpha, \beta \in S_8$, where $\alpha = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 2 & 1 & 3 & 5 & 4 & 7 & 6 & 8 \end{bmatrix}$ and $\beta = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 1 & 3 & 8 & 7 & 6 & 5 & 2 & 4 \end{bmatrix}$.
   (a) [1] Compute α^{-1}.
   (b) [1] Compute $\beta\alpha$
   (c) [1] Write α as a product of 2-cycles.
   (d) [1] Write β as a product of disjoint cycles.
3. [3] In S_4 find a cyclic subgroup of order 4 and a noncyclic subgroup of order 4.

HW6 Writing Focus

1. [5] Let $H = \{\beta \in S_5 | \beta(1) = 1 \text{ and } \beta(4) = 4\}$. Prove that $H \leq S_5$.

WrittenHW 6

1. [2] Show $U(8)$ is not isomorphic to $U(10)$.
2. [3] Let $g, h \in G$ where G is a group. Let the function ϕ_g be defined by $\phi_g(x) = gxg^{-1}$ for all $x \in G$. Is $\phi_g \phi_h = \phi_{gh}$? Justify your answer.
3. [2] Let $G = \{a + b\sqrt{2} | a, b \in \mathbb{Q}\}$ and $H = \{\begin{bmatrix} a & 3b \\ b & a \end{bmatrix} | a, b \in \mathbb{Q}\}$. Show that G and H are isomorphic under addition.
4. [3] Let $G = \{a + b\sqrt{2} | a, b \in \mathbb{Q}\}$ and $H = \{\begin{bmatrix} a & 3b \\ b & a \end{bmatrix} | a, b \in \mathbb{Q}\}$. Show that G and H are isomorphic under multiplication.

HW6 Writing Focus

1. [5] Let G be a group. Prove that the mapping $\phi(g) = g^{-1}$ for all $g \in G$ is an automorphism if and only if G is Abelian.
2. [5] Suppose that G is a finite Abelian group and G has no element of order 2. Prove that the mapping $g \to g^2$ is an automorphisms of G.