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TORSION UNITS IN INTEGRAL GROUP RINGS

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(Communicated by Ronald M. Solomon)

ABSTRACT. Let $G = \langle a \rangle \rtimes X$ where $\langle a \rangle$ is a cyclic group of order n, X is an abelian group of order m, and $(n, m) = 1$. We prove that if $\mathbb{Z}G$ is the integral group ring of G and H is a finite group of units of augmentation one of $\mathbb{Z}G$, then there exists a rational unit γ such that $H^\gamma \subseteq G$.

Let G be a finite group, $\mathbb{Z}G$ the integral group ring of G, and $U_1\mathbb{Z}G$ the group of units of augmentation one in $\mathbb{Z}G$. It has been conjectured by Zassenhaus that if H is a finite subgroup of $U_1\mathbb{Z}G$, then H is conjugate to a subgroup of G by a rational unit, i.e., there exists $\gamma \in U\mathbb{Q}G$ such that $H^\gamma \subseteq G$.

This conjecture has been confirmed by Weiss in [8] for p-groups. In this note we shall prove this conjecture for a certain class of metabelian groups. More precisely, we will establish the following result:

Theorem. *Let G be a split extension $\langle a \rangle \rtimes X$, where $\langle a \rangle$ is a cyclic group of order n, X is an abelian group of order m, and $(n, m) = 1$. If $H \subseteq U_1\mathbb{Z}G$ is a finite group, then there exists $\gamma \in U\mathbb{Q}G$ such that $H^\gamma \subseteq G$.*

Before proceeding to the proof of the theorem we record some useful facts that will be needed.

If N is a normal subgroup of G, let us denote by $\Delta(G, N)$ the kernel of the natural map $\mathbb{Z}G \to \mathbb{Z}(G/N)$. Also we briefly write $u \sim g$ to indicate that u is conjugate in $\mathbb{Q}G$ to g.

Lemma 1. *Let $G = A \rtimes X$, where A is an abelian normal p-group and X is any group with $(|A|, |X|) = 1$. Let $u \in U_1\mathbb{Z}G$ be a unit of the form $u = vw$, where $v \in U(1 + \Delta(G, A))$, $w \in U_1\mathbb{Z}X$. If u has finite order not divisible by p, then $u \sim w$.*

Proof. See [3, Lemma 2].

Lemma 2. *Let $G = \langle a \rangle \rtimes X$, where $o(a) = n$, $|X| = m$, and $(n, m) = 1$. If an element $a^i x$ of G, where $x \in X$, is of order divisible by all primes dividing n, then x is central in G.*

Proof. It is a consequence of [4, Lemma 2.3].

Lemma 3. *Let G be a split extension $\langle a \rangle \rtimes X$, where $\langle a \rangle$ is a cyclic group of order n, X is an abelian group of order m, and $(n, m) = 1$. If G_0 is a*

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Units In Integral Group Rings

SB Merriam

Units In Integral Group Rings:

Decoding **Units In Integral Group Rings**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its capability to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Units In Integral Group Rings**," a mesmerizing literary creation penned with a celebrated wordsmith, readers set about an enlightening odyssey, unraveling the intricate significance of language and its enduring effect on our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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