1077-08-382 **Valmir Bucaj*** (vbuqaj@gmail.com), 1000 West Court Street, Seguin, TX 78155. *Finding Factors of Factor Rings over the Eisenstein Integers.* Preliminary report.

Eisenstein integers are defined to be the set $Z[\omega] = \{a+b\omega : a, b \in \mathbb{Z}\}$ where $w = (-1+i\sqrt{3})/2$. This set lies inside the set of complex numbers $\mathbb{C}$ and they also form a commutative ring in the algebraic number field $\mathbb{Q}(\omega)$. In this paper we prove a few results related to the factor rings over the Eisenstein integers. In particular we show that the ring $\mathbb{Z}[\omega]$ factored by an ideal generated by any element $m + n\omega$ of this ring, where $g.c.d(m, n) = 1$ is isomorphic to the ring $\mathbb{Z}_{N(m+n\omega)}$, where N is the norm function given by $N(m + n\omega) = (m + n\omega)(m + n\bar{\omega}) = m^2 + n^2 - mn$. This result helps us quickly answer questions about the number of elements of the factor ring $\mathbb{Z}[\omega]/\langle m + n\omega\rangle$. Then, we give a representation for the factor ring $\mathbb{Z}[\omega]/\langle m + n\omega\rangle$ in terms of simpler rings. Finally, at the end we give a few applications to elementary number theory, more specifically we use some of the results in this paper to find all solutions of the equation $p = m^2 + n^2 - mn$ where p is a prime not congruent to 2 mod 3, and $m, n \in \mathbb{Z}^+$. (Received August 30, 2011)