matrix $W_3 = F_0(N)$. Clearly, $\Delta_2(W_3) = F_0(S(G))$. Since $G(x)$ is a minimal
rix $S(G)$ and $\bar{G}(x)$ is the minimal polynomial of the matrix $\overline{S(G)}$ it follows
or the matrix $S(G)$ there are no nonzero polynomials modulo J^2 of degree
ld annihilate it modulo J^2. Consequently,

$$\Delta_2(W_3) = F_0(S(G)) \not\equiv 0 (\mathrm{mod}\, J^2).$$

from (35), (36) and (38) that $\Delta_2(F(A)) \not\equiv 0(\mathrm{mod}\ J^2)$, i.e., $F(A) \neq 0$.
oof of Theorem 9.

served in the introduction, Theorem 9 includes as special cases the re-
] for commutative rings. Moreover, Theorem 9 significantly extends the
iants in comparison with those described in the previous papers. For
over $\mathbf{Z}/2^n$, the polynomial $x^2 + e$ which could be considered comparable
he latter a strong invariant: $x^2 + e = (x + e)^2 - 2(x + e) + 2e$. In
over $\mathbf{Z}/p^n$ every polynomial which is congruent modulo p^2 to $x^p + (p -$
iant.

d and Third Degree over a Principal Ideal Ring

R denotes a commutative artinian principal ideal ring, $J = \pi R \neq 0$. Then
l number n such that $J^n = 0$ and all the proper ideals of R are $J = \pi R$,
$\pi^{n-1}R$ (cf. [15, Chap. 4]). In this case the similarity problem for
s to the similarity problem for matrices $A \in R_m$ with $\bar{A} \neq 0$ since if
hen $A \approx B$ if and only if the images of the matrices A_1 and B_1 over the
ar.

ume that $A \in R_2$ and $\bar{A} \neq \bar{0}$. Then exactly one of the following cases

$= (e)$ and $A \approx S(\chi_A(x))$, $\mathrm{Ann}(A) = (\chi_A(x))$.

$= (x - r)$, where $r \in R$, and $A = rE$, $\mathrm{Ann}(A) = (x - r)$.

$) = (x - r, \pi^k)$, where $r \in R$, $0 < k < n$, and $A \approx rE + \pi^k S(G(x))$, where
d the polynomial $\pi^k G(x)$ is uniquely determined by the matrix $\chi_A(x) =$
$- \pi^{2k}b$, $\mathrm{Ann}(A) = (\chi_A(x), \pi^{n-k}(x - r))$.

canonically determined if and only if all its Fitting invariants are

$\overline{\mathscr{D}_s(xE-A)} = \mathscr{D}_s(x\bar{E}-\bar{A})$, $s = \overline{1, 2}$ it follows that if $\mathscr{D}_1(xE-A) = (F(x)) + \mathscr{D}_1$
e $F(x)$ is a monic polynomial, then $\deg F(x) \leq 1$. Therefore one of the
ust apply to the ideal $\mathscr{D}_1(xE-A)$.

I the statements of the theorem are consequences of the fact that all
$xE - A$ are principal ideals and that therefore A is a normal marrix

s clear that the matrix A is of the form $A = rE + \pi^k B$, where the minimal
rix $\bar{B}$ coincides with its characteristic polynomial. Indeed, if this is
or suitable $b \in R$ and $A = r_1E + \pi^{k+1}B_1$, i.e., the ideal $\mathscr{D}_1(xE - A)$ is
, contrary to the assumption. Consequently, if $\chi_B(x) = G(x)$ then $B \approx$
$S(G)$ then $T^{-1}AT = rE + \pi^k S(G)$. Clearly, if also $A \approx rE + \pi^k S(G_1)$, then
) and $G_1(x) \equiv G(x)(\mathrm{mod}\ J^{n-k})$, i.e., $\pi^k G_1(x) = \pi^k G(x)$.

$G(x) = x^2 - ax - b$ and that $b_1 \in R$ is an element with the properties
^{2k}b (the existence of such an element is guaranteed by the conditions
it is easily seen that the matrix $A_1 = rE + \pi^k S(G_1)$, where $G_1(x) = x^2 -$
r to A but $\mathscr{D}_s(xE-A) = \mathscr{D}_s(xE-A_1)$ for $s = 1, 2$. Consequently, if
canonically determined matrix. The last statement of Theorem 10 follows.

[16] representatives of classes of conjugate elements in the group R_2^*
are given.

degree three over R the situation becomes significantly more complex,
only possible to describe possible canonical forms for $A \in R_3$ in the