Pacific Journal of Mathematics

CORRECTION TO: "GALOIS THEORY OF DIFFERENTIAL FIELDS OF POSITIVE CHARACTERISTIC"

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Vol. 140, No. 2 October 1989

ERRATA
CORRECTION TO GALOIS THEORY OF DIFFERENTIAL FIELDS OF POSITIVE CHARACTERISTIC

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Volume **138** (1989), 151–168

The proof of Proposition 11 of this paper contains an error in the stage of proving that $C(\sigma)$ is finitely generated over C. We present here a correct proof.

Proof. Since σN is finitely generated over K and σ is strong, $N\sigma N = NC(\sigma)$ is finitely generated over N. Hence, there exist elements $\gamma_1, \dots, \gamma_s$ of $C(\sigma)$ such that $NC(\sigma) = N(\gamma_1, \dots, \gamma_s)$. For each element c of $C(\sigma)$, there exist polynomials F and G in $N[X_1, \dots, X_s]$ such that

$$F(\gamma_1, \dots, \gamma_s) - cG(\gamma_1, \dots, \gamma_s) = 0 \tag{1}$$

and $G(\gamma_1, \dots, \gamma_s) \neq 0$. Among the monomials of $\gamma_1, \dots, \gamma_s$ in the equation (1), we choose linearly independent elements $c_1, \dots, c_r$ over C and rewrite (1) in the form

$$\sum_{i=1}^{r} c_i a_i - c\left(\sum_{i=1}^{r} c_i b_i\right) = 0 \tag{2}$$

where $a_1, \dots, a_r, b_1, \dots, b_r \in N$ and $\sum_{i=1}^{r} c_i b_i \neq 0$. If $\{\alpha_1, \dots, \alpha_t\}$ is a maximal set of linearly independent elements over C in $\{a_1, \dots, a_r, b_1, \dots, b_r\}$, then a_i and b_i $(i = 1, \dots, r)$ are represented by

$$a_i = \sum_{j=1}^{t} a_{ij}\alpha_j \qquad (a_{i1}, \dots, a_{it} \in C)$$

and

$$b_i = \sum_{j=1}^{t} b_{ij}\alpha_j \qquad (b_{i1}, \dots, b_{it} \in C).$$

By (2), we have

$$\begin{aligned} 0 &= \sum_{i=1}^{r} c_i\left(\sum_{j=1}^{t} a_{ij}\alpha_j\right) - c\left(\sum_{i=1}^{r} c_i\left(\sum_{j=1}^{t} b_{ij}\alpha_j\right)\right) \\ &= \sum_{j=1}^{t}\left(\sum_{i=1}^{r} c_i a_{ij} - c\left(\sum_{i=1}^{r} c_i b_{ij}\right)\right)\alpha_j. \end{aligned}$$

Since N and $C(\sigma)$ are linearly disjoint over C, $\alpha_1, \dots, \alpha_t$ are linearly independent over $C(\sigma)$ and thus

$$(3) \qquad \sum_{i=1}^{r} c_i a_{ij} - c\left(\sum_{i=1}^{r} c_i b_{ij}\right) = 0 \qquad (j = 1, \dots, t).$$

Suppose $\sum_{i=1}^{r} c_i b_{ij}$ $(j = 1, \dots, r)$ are all equal to zero, then

$$b_{ij} = 0 \qquad (i = 1, \dots, r,\ j = 1, \dots, t)$$

since $c_1, \dots, c_r$ are linearly independent over C. Thus,

$$\sum_{i=1}^{r} c_i b_i = \sum_{i=1}^{r} c_i \left(\sum_{j=1}^{t} b_{ij}\alpha_j\right) = 0,$$

and this contradicts $\sum_{i=1}^{r} c_i b_i \neq 0$. Therefore, there exists at least one index k such that $\sum_{i=1}^{r} c_i b_{ik} \neq 0$. Consequently, by (3),

$$c = \frac{\sum_{i=1}^{r} c_i a_{ij}}{\sum_{i=1}^{r} c_i b_{ij}} \in C(\gamma_1, \dots, \gamma_s).$$

ACKNOWLEDGMENTS

The editors gratefully acknowledge the service of the following persons who have been consulted concerning the preparation of volumes one hundred thirty-five through one hundred thirty-eight of the Pacific Journal of Mathematics.

C. Akemann, R. A. Askey, D. Babbitt, R. Bass, S. Berberian, M. Bestvina, B. Blackadar, A. Blass, R. Blattner, M. Camberon, P. J. Cassidy, G. Chen, P. Chernoff, H. Choi, P. Cordaro, J. Cygan, C. Delzell, J. Diestel, D. Drasin, B. M. Dwork, R. Edwards, E. G. Effros, D. E. Evans, T. Fack, H. Fattorini, J. Feldman, J. Fornaess, J. Garnett, G. Gasper, H. Glover, B. Gordon, A. Gray, S. P. Gudder, R. Gulliver, U. Haagerup, D. Haile, J. Harper, J. S. Hsia, L. Husch, W. Johnson, V. F. R. Jones, M. Kaneda, Y. Kannai, M. Karoubi, H. Kosaki, M. Landstad, D. R. Larson, K. C. Lin, J. Lubow, S. Popa, R. T. Powers, L. Ratliff, J. R. Reay, J. Rogawski, J. Rosenberg, L. Rothschild, S. Sakai, P. Schaefer, J. R. Schulenberger, E. Schulte, C. Scovel, J. Shaneson, S. J. Sidney, L. Simon, W. F. Stoll, R. Strichartz, C. Sutherland, M. E. Sweedler, M. Takesaki, F. Treves, G. Triantafillou, H. Upmeier, V. S. Varadarajan, D. Voiculescu, W. Von Wahl, M. E. Walter, H. L. Wu

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The *Pacific Journal of Mathematics* is issued monthly as of January 1966. Regular subscription rate: $190.00 a year (5 Vols., 10 issues). Special rate: $95.00 a year to individual members of supporting institutions.

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Pacific Journal of Mathematics

Vol. 140, No. 2 October, 1989