



Footnote on p. 79. Delete “(written under Hilbert)”. Junker was, in fact, a student of Brill in Tübingen.

Thanks to Emmanuel Briand for pointing this out to me.

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On page 90, the third formula (5.11) should be

$$(Q, R)^{(3)} = m(m-1)(m-2)Q'''R - 3(m-1)(m-2)(n-2)Q''R' + \\ + 3(m-2)(n-1)(n-2)Q'R'' - n(n-1)(n-2)QR'''.$$

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On page 92, formula (5.16) the last term should have  $-3$  as a coefficient:

$$V = Q^3Q'''' - 4\frac{(n-3)}{n}Q^2Q'Q''' + 6\frac{(n-2)(n-3)}{n^2}QQ'{}^2Q'' - 3\frac{(n-1)(n-2)(n-3)}{n^3}(Q')^4$$

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In a paper by D. Zagier, Modular forms and differential operators, Proc. Indian Acad. Sci. (Math. Sci.) 104 (1994) 57–75, the connection between transvectants and Rankin-Cohen brackets is presented as an open problem. Thus, the remark on p. 92 answers Zagier’s question. The key is to note that the degree of a binary form or covariant is minus its weight when considered as a modular form. Therefore, the transvectants of negative weight covariants agree with the Rankin-Cohen brackets of positive weight modular forms. Note that the change in sign is in accordance with how the power of the multiplier appears in the transformation rule (2.8).

Further details and interesting new developments can be found in Olver, P.J., Sanders, J., Transvectants, modular forms, and the Heisenberg algebra, Adv. Appl. Math. 25 (2000) 252–283. See also Choie, Mourrain, and Solé, Rankin-Cohen brackets and invariant theory, J. Alg. Combin. 13 (2001) 5–13, for another perspective on this connection between classical invariant theory and modular forms.

Thanks to Patrick Solé and Jan Sanders for correspondence on this point.

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The formula on the next to last line of page 98 should be  $[[P, Q]]_t = \{P, Q\} + O(t^2)$

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On p. 118, (6.40) should include the conditions  $\alpha \neq \beta$ ,  $\gamma \neq \delta$ . Similarly, the Capelli identity (6.42) should include the condition  $\alpha \neq \beta$ .

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On page 178, formula (8.32): change  $(m - j)!$  to  $(n - m)!$

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On page 179, in (8.37), the formulas for  $\gamma$  and  $\delta$  are each missing a term:

$$\gamma = \frac{1}{n} Q^{(1-n)/n} Q', \quad \delta = Q^{1/n} - \frac{1}{n} p Q^{(1-n)/n} Q'.$$

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On pages 192-193, the formulae for the polynomials  $A$  and  $B$  are not quite correct. One needs to cancel common factors in the rational covariants  $J$  and  $K$  before multiplying out. Details and further results on discrete symmetries of polynomials can be found in the paper

Berchenko, I., Olver, P.J., Symmetries of polynomials, J. Symb. Comp. 29 (2000) 485–514.

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On page 193, part (a) of Corollary 8.68 should read only  $k \leq 6n - 12$ . Equality is not achieved if either the equation  $A(p, q) = 0$  has multiple roots, or the covariants  $T$  and  $H$  have common factors. See the preceding paper for details.

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On page 195, replace  $J$  by  $J^2$  in equation (8.70), which should read

$$9j^2 \left(K + \frac{8}{3}\right)^3 = 2i^3 \left(K - \frac{1}{2}J^2 + \frac{16}{9}\right)^2. \quad (8.70)$$

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p. 210: In Theorem 9.28 change  $X \subset \mathbb{R}^n$  to  $X \subset \mathbb{R}^m$ .

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p. 210: Equation (9.21) is missing a centered dot:  $I(e^{-tJ} \cdot x) = I(x)$ .

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The discussion of semi-invariants on pp. 218–221 is flawed. The basic (and classical) definition should state a semi-invariant is a relative invariant for the upper triangular subgroup  $U$ , meaning that

$$\mathbf{v}_-(F) = 0, \quad \text{and} \quad \mathbf{v}_0(F) = kF,$$

where  $k = 2 \text{ wt } F - \text{ord } F \text{ deg } Q$  is called the *index* of the semi-invariant.

An invariant is a semi-invariant of index 0. Proposition 9.45 should state that the leading coefficient  $K(a)$ , not the leading term, of a covariant (9.46) is a semi-invariant of index  $n$ . The proof should be modified accordingly. (The leading term  $L(a, x) = K(a)x^n$  of (9.46) is invariant under  $\mathbf{v}_0$ , but not invariant at all under  $\mathbf{v}_-$ .)

Furthermore, in the proof of Theorem 9.49, one needs to modify the proof that  $\mathbf{v}_+^{n+1}K = 0$ , basing it on (9.49) as described in Hilbert's paper.

p. 219, last line: change  $\widehat{Q} = a_0$  to  $\widehat{Q} = a_3$ .

p. 220, formulas (9.47–49): Several + and – signs need to be fixed:

$$\mathbf{v}_0\mathbf{v}_- = \mathbf{v}_-(\mathbf{v}_0 + 2), \quad \mathbf{v}_0\mathbf{v}_+ = \mathbf{v}_+(\mathbf{v}_0 - 2), \quad \mathbf{v}_+\mathbf{v}_- = \mathbf{v}_-\mathbf{v}_+ + \mathbf{v}_0. \quad (9.47)$$

$$\mathbf{v}_0(\mathbf{v}_-)^k = (\mathbf{v}_-)^k(\mathbf{v}_0 + 2k), \quad \mathbf{v}_0(\mathbf{v}_+)^k = (\mathbf{v}_+)^k(\mathbf{v}_0 - 2k). \quad (9.48)$$

$$\begin{aligned} \mathbf{v}_+(\mathbf{v}_-)^k &= (\mathbf{v}_-)^k\mathbf{v}_+ + (\mathbf{v}_-)^{k-1}[-k\mathbf{v}_0 - k(k-1)], \\ \mathbf{v}_-(\mathbf{v}_+)^k &= (\mathbf{v}_+)^k\mathbf{v}_- + (\mathbf{v}_+)^{k-1}[k\mathbf{v}_0 - k(k-1)]. \end{aligned} \quad (9.49)$$

p. 221, line -5: change  $\mathbf{v}_0(K) = -nK$  to  $\mathbf{v}_0(K) = nK$ .

Following equation:

$$\begin{aligned} \mathbf{v}_0[\{(\mathbf{v}_+)^k K\} x^{n-k} y^k] &= \\ &= \{(\mathbf{v}_+)^k(\mathbf{v}_0 - 2k)K\} x^{n-k} y^k + (2k - n)\{(\mathbf{v}_+)^k K\} x^{n-k} y^k = 0, \end{aligned}$$

p. 221, top displayed equation: Change sign in front of  $k\mathbf{v}_0$  term:

$$\begin{aligned} \mathbf{v}_-[\{(\mathbf{v}_+)^k K\} x^{n-k} y^k] &= \\ &= \{(\mathbf{v}_+)^k \mathbf{v}_- K + (\mathbf{v}_+)^{k-1}[k\mathbf{v}_0 - k(k-1)]K\} x^{n-k} y^k \\ &\quad - (n-k)\{(\mathbf{v}_+)^k K\} x^{n-k-1} y^{k+1} \\ &= k(n-k+1)\{(\mathbf{v}_+)^{k-1} K\} x^{n-k} y^k - (n-k)\{(\mathbf{v}_+)^k K\} x^{n-k-1} y^{k+1}. \end{aligned}$$

Bottom displayed equation: Change sign of middle terms:

$$\begin{aligned} \mathbf{v}_-(\mathbf{v}_+)^k(\mathbf{v}_-)^k &= \\ &= (\mathbf{v}_+)^k(\mathbf{v}_-)^{k+1} + k(\mathbf{v}_+)^{k-1}\mathbf{v}_0(\mathbf{v}_-)^k - k(k-1)(\mathbf{v}_+)^{k-1}(\mathbf{v}_-)^k \\ &= (\mathbf{v}_+)^k(\mathbf{v}_-)^{k+1} + k(\mathbf{v}_+)^{k-1}(\mathbf{v}_-)^k\mathbf{v}_0 + k(k+1)(\mathbf{v}_+)^{k-1}(\mathbf{v}_-)^k. \end{aligned}$$

I would like to thank James Murdock and Frank Leitenberger for sharing their corrections to the material on semi-invariants.

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pp. 252 & 261: change Hermite, M. to Hermite, Ch.

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