

CORRECTION TO “A NEW METHOD FOR SOLVING QUARTICS”

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An error in Eq. (14) of the paper “A new method for solving quartics” (<http://www.tmrfindia.org/sutra/v2i23.pdf>) is identified and corrected.

Keywords: Quartic equation, cubic equation, polynomial decomposition.

Kulkarni (2009) has recently introduced a new method of solving quartics. Unfortunately, a key equation in the method is typed incorrectly. If a reader tried to apply the method without first checking all equations, the correct roots of the quartic will not be gotten, as this author found out the hard way. The error is in Eq. (14): specifically, the a_1a_2 term should in fact be a_1a_3 .

To see this, recall that Eq. (14) is derived from Eq. (12) which states that

$$p\{[p + a_2 - a_3^2/4]^2 - 4a_0\} = \{(a_3/2)(p + a_2 - a_3^2/4) - a_1\}^2. \quad (12)$$

Also, Kulkarni (2009) defined $F_1 = a_2 - a_3^2/4$ and $p_1 = p + F_1$ in Eq. (13). Substituting (13) into (12) gives

$$\begin{aligned} (p_1 - F_1)(p_1^2 - 4a_0) &= \{(a_3/2)p_1 - a_1\}^2 \\ \text{or } p_1^3 - p_1 4a_0 - F_1 p_1^2 + F_1 4a_0 &= (a_3^2/4)p_1^2 - a_1 a_3 p_1 + a_1^2 \\ \text{or } p_1^3 - (F_1 + a_3^2/4)p_1^2 + (a_1 a_3 - 4a_0)p_1 + F_1 4a_0 - a_1^2 &= 0 \\ \text{or } p_1^3 - a_2 p_1^2 + (a_1 a_3 - 4a_0)p_1 + 4a_0 F_1 - a_1^2 &= 0. \end{aligned} \quad (14)$$

Thus Eq. (14) should contain the term a_1a_3 and not the term a_1a_2 as given in (14) of the original paper.

Fortunately, the cubic equation given in the numerical example in Kulkarni (2009) is correct, even though it was obtained from Eq. (14). This suggests then that the error maybe simply typographical.

Reference

Kulkarni, R. G. (2009): A new method for solving quartics, *Sutra: International Journal of Mathematical Science Education*, **2**, pp. 24-26.