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# COMMENT ON PROBLEM H-315

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Recently I came to know Problem H-315 of *The Fibonacci Quarterly* (Vol. 18, 1980) which deals with "Kerner's method" for the simultaneous determination of polynomial roots. I want to comment on two aspects of the problem and its solution.

1. The method was already used by K. Wierstrass for a constructive proof of the fundamental theorem of algebra (cf. [1]). Kerner [2] realized that the method can be interpreted as a Newton method for the elementary symmetric functions; this fact is also observed in the textbook of Durand ([3], pp. 279-80) which appeared several years before Kerner's publication.

2. It is remarkable that the assumption

$$\sum_{i=1}^{n} z_i = -a_{n-1}$$

is *not* necessary for the validity of the assertion! This fact is mentioned by Byrnev and Dochev [4] where further references are given. The proof of the assertion

$$\sum_{i=1}^{n} \hat{z}_i = -a_{n-1}$$

is easy: following Kerner's derivation of the method, one must apply Newton's method to the system of elementary symmetric functions. Hence, one of the equations reads:

$$\sum_{i=1}^{n} x_i = -a_{n-1} \quad (x_1, x_2, \ldots, x_n \text{ denote the unknowns}).$$

[Please turn to page 188]