Consecutive Primes in Arithmetic Progression

By L. J. Lander and T. R. Parkin

A. Schinzel and W. Sierpiński [1] conjectured that there exist arbitrary long arithmetic progressions formed of consecutive prime numbers. Sierpiński stated in [2] that a progression of five consecutive primes had not yet been found. A direct computer search showed that the first such progression has the common difference $d = 30$ and begins with the prime 9,843,019. The first progression of six consecutive primes begins with 121,174,811 and also has $d = 30$. Up to the limit 3×10^8 there are 25 other progressions of five consecutive primes, all with $d = 30$; there are no other progressions of six consecutive primes.

The referee points out that recently a much larger quintuplet, beginning with 10000024493, and again having $d = 30$, was recorded [3], but without reference to Sierpiński's remark. The smaller set that we found, and the single sextuplet, may still be worth recording.

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1. A. Schinzel & W. Sierpiński, "Sur certaines hypothèses concernant les nombres premiers," *Acta Arith.*, v. 4, 1958, p. 191. MR **21** #4936.
2. W. Sierpiński, *A Selection of Problems in the Theory of Numbers*, Macmillan, New York, 1964, p. 105. MR **30** #1078.
3. M. F. Jones, M. Lal & W. J. Blundon, "Statistics on certain large primes," *Math. Comp.*, v. 21, 1967, pp. 103–107.

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Convergence of Successive Substitution Starting Procedures

By A. C. R. Newbery

The method of successive substitutions (also known as Picard's method) has been proposed [1], [2] as a means of initialising the numerical solution of the differential equation $x' = f(x, t)$. The method is capable of advancing the solution k steps at an average cost of k function-evaluations per step with a truncation error of order $O(h^{k+2})$. This makes it potentially one of the most efficient methods available for the purpose, and so it seems appropriate to study its numerical convergence properties. The method is based on k formulas of the form $x_r = x_0 + hL_r(x_0', x', \cdots, x_k')$, $r = 1, 2, \cdots, k$ where, L_r denotes a linear combination with known constant coefficients. The required coefficients are implicit in the corrector matrices published in [3]. For a given k, the coefficients in L_r are the entries in the rth column of the kth corrector matrix. For example with $k = 2$ we would obtain the formulas:

$$x_1 = x_0 + (h/24)(10x_0' + 16x_1' - 2x_2')\ ,\quad x_2 = x_0 + (h/24)(8x_0' + 32x_1' + 8x_2')\ .$$

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