JRM v n p298

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2. A. W. Dickinson, The Quadratic Formula Revisited, *J. Recreational Math.*, *3*(1), pp. 31-33, January 1970. *Note:* The last equation given on page 32 of this reference is in error and should read $x_2 = c/ax_1$.
3. E. Whittaker and G. Robinson, *The Calculus of Observations*, Fourth Edition, Blackie & Sons Ltd., London, 1962. See paragraph 60 on page 120 for a literal formula suitable for evaluating the roots of quadratic equations.
4. F. Cajori, *An Introduction to the Theory of Equations*, Dover Publications, Inc., New York, 1969, Chapter III.

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The Stamp Problem

The postage stamp problem reported on by Heimer and Langenbach [1] was investigated several years ago by Lunnon [2]. He gives a history of the problem going back to 1960 (although I can't help but think the problem is older than that) and gives extensive tables of the results of his computer solutions, which go out to 14 stamps and 12 denominations. Lunnon's Table 2, rearranged to correspond to Heimer and Langenbach's Table 1, is reproduced below. Note that Heimer and Langenbach's guess of 216 ± 3 for 6 denominations and 5 stamps is incorrect. However, all calculated points common to the two tables agree.

Maximum Number of Stamps Used

Denominations	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	4	7	10	14	18	23	28	34	40	47	54	62	70
3	8	15	26	35	52	69	89	112	146	172	212	259	302
4	12	24	44	71	114	165	234	326	427	547	708	873	1094
5	16	36	70	126	216	345	512	797					
6	20	52	108	211	388								
7	26	70	162										
8	32	93											
9	40	121											
10	46												
11	54												
12	64												

References

1. R. L. Heimer and Herbert Langenbach, The Stamp Problem, *J. Recreational Math.*, *7*(3), pp. 235-250, Summer 1974.
2. W. F. Lunnon, A Postage Stamp Problem, *The Computer Journal*, *12*(4), pp. 377-380, November 1969.

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Euler's ϕ-Function

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