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over the three-letter alphabet $\{\alpha, \beta, \gamma\}$. This is, of course, the smallest possible alphabet with an infinite square-free string (clearly, a square-free word over a two-letter alphabet will come to an end after three entries) with which the whole theory started in the work of Axel Thue [19, Satz 3], [20, Sätze 6, 7, 20].

Obviously, t (as in fact any word with more than 7 elements over a three-letter alphabet) is not strongly square-free. Maybe TH sequences hold a clue for a more direct approach to the question (cf. [6]), if there is an infinite strongly square-free string over a four-letter alphabet, which has been answered positively by V. Keränen [16] employing a computer-aided proof.

(An abelian square of length $2 \cdot 6$ in h starts after position 6.)

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REFERENCES

- [1] AFRIAT, S.N. *The Ring of Linked Rings*. Duckworth (London), 1982.
- [2] ALLOUCHE, J.-P., D. ASTOORIAN, J. RANDALL and J. SHALLIT. Morphisms, Squarefree Strings, and the Tower of Hanoi Puzzle. *Amer. Math. Monthly* 101 (1994), 651–658.
- [3] ALLOUCHE, J.-P. et F. DRESS. Tours de Hanoï et automates. *RAIRO Inform. Théor. Appl.* 24 (1990), 1–15.
- [4] BERSTEL, J. Some recent results on squarefree words. In *STACS 84 (Lecture Notes in Comput. Sci. 166)*, G. Goos, J. Hartmanis (eds.), Springer (Berlin), 1984, 14–25.
- [5] BOYER, C. B. *A History of Mathematics*. Princeton University Press (Princeton), 1985.
- [6] BROWN, T. C. Is there a sequence on four symbols in which no two adjacent segments are permutations of one another? *Amer. Math. Monthly* 78 (1971), 886–888.
- [7] CLAUS, N. (= E. LUCAS). *La Tour d'Hanoï, Véritable casse-tête annamite*. P. Bousrez (Tours), 1883.
- [8] CLAUS, N. (= E. LUCAS). La Tour d'Hanoï, Jeu de calcul. *Science et Nature*, Vol. I, N° 8 (1884), 127–128.
- [9] CUMMINGS, L. J. Gray codes and strongly square-free strings. In *Sequences II, Methods in Communication, Security, and Computer Science*, R. Capocelli, A. De Santis, U. Vaccaro (eds.), Springer (New York), 1993, 439–446.

- [10] GLAISHER, J. W. L. On the residue of a binomial-theorem coefficient with respect to a prime modulus. *Quart. J. Pure Appl. Math.* 30 (1899), 150–156.
- [11] DE GUZMÁN, M. The role of games and puzzles in the popularization of mathematics. *Enseign. Math.* (2) 36 (1990), 359–368.
- [12] HARKIN, D. On the mathematical work of François-Édouard-Anatole Lucas. *Enseign. Math.* (2) 3 (1957), 276–288.
- [13] HINZ, A.M. The tower of Hanoi, *Enseign. Math.* (2) 35 (1989), 289–321.
- [14] —— Pascal’s triangle and the tower of Hanoi. *Amer. Math. Monthly* 99 (1992), 538–544.
- [15] HINZ, A. M. and A. SCHIEF. The average distance on the Sierpiński gasket. *Probab. Theory Related Fields* 87 (1990), 129–138.
- [16] KERÄNEN, V. Abelian Squares are avoidable on 4 letters. In *Automata, Languages and Programming*, W. Kuich (ed.), Springer (Berlin), 1992, 41–52.
- [17] PLEASANTS, P. A. B. Non-repetitive sequences. *Proc. Camb. Phil. Soc.* 68 (1970), 267–274.
- [18] STEWART, I. Four encounters with Sierpiński’s gasket. *Math. Intelligencer* 17, N° 1 (1995), 52–64.
- [19] THUE, A. Über unendliche Zeichenreihen. *Kra. Vidensk. Selsk. Skrifter. I. Mat. Nat. Kl.* 1906 N° 7, 1–22 = *Selected Mathematical Papers of Axel Thue*, T. Nagell, A. Selberg, S. Selberg, K. Thalberg (eds.), Universitetsforlaget (Oslo), 1977, 139–158.
- [20] —— Ueber die gegenseitige Lage gleicher Teile gewisser Zeichenreihen. *Kra. Vidensk. Selsk. Skrifter. I. Mat. Nat. Kl.* 1912 N° 1, 1–67 = *Selected Mathematical Papers of Axel Thue*, T. Nagell, A. Selberg, S. Selberg, K. Thalberg (eds.), Universitetsforlaget (Oslo), 1977, 413–477.

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