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Binary words, avoidable powers, and the constant $7/3$

In recent years, the fraction $7/3$ has appeared several times as a threshold for various properties of binary words. Shur showed that the bi-infinite overlap-free words are exactly the bi-infinite $7/3$-power-free words. Karhumäki and Shallit showed that Restivo and Salemi's factorization theorem for overlap-free binary words holds for $7/3$-power-free binary words as well. They also showed that the threshold between polynomial growth and exponential growth for k-power-free binary words is $k = 7/3$. Kolpakov, Kucherov, and Tarannikov showed that $k = 7/3$ is also a threshold for the minimal letter density in k-power-free binary words. We present here a generalization of a result by Séébold by showing that the only infinite $7/3$-power-free binary words that can be obtained by iterating a morphism are the Thue–Morse word and its complement. Further, the constant $7/3$ is best possible.