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03755. *Sets of integers which contain no three term in geometric progression.*

The problem of looking for subsets of the natural numbers which contain no 3-term arithmetic progressions has a rich history. Roth's theorem famously shows that any such subset cannot have positive upper density. In contrast, Rankin in 1960 suggested looking at subsets without geometric progressions, and constructed such a subset with asymptotic density about 0.719. More recently, several authors have found upper bounds for the upper density of such sets. We significantly improve upon these upper bounds, and demonstrate a method of constructing sets with a greater upper density than Rankin's set. This construction is optimal in the sense that this method gives a way of effectively computing the greatest possible upper density of a geometric-progression-free set. Finally, we show that geometric progressions mod N behave more like Roth's theorem in that one cannot take any fixed positive proportion of the integers modulo a sufficiently large value of N while avoiding geometric progressions. (Received September 17, 2013)