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*Unrolling residues to avoid progressions*

A result of van der Waerden states given any  $k$  there is some  $N_0$  that for any  $n \geq N_0$  and any coloring of the numbers from 1 to  $n$  with two colors, there will be  $k$  of the numbers which were assigned the same color and lie in an arithmetic progression. This can be extended further to show that not only must there be one such monochromatic progression but there must be many. We consider the problem of finding a “good” coloring which has relatively few of these monochromatic progressions and give the best known colorings for some small cases.