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**John L Goldwasser\*** (jgoldwas@math.wvu.edu). *Polychromatic colorings of the integers mod  $n$ .*

Given a finite subset  $S$  of the integers, we say a coloring of the integers mod  $n$  with  $r$  colors is  $S$ - $n$ -polychromatic if every translate of the mod  $n$  congruence classes of  $S$  in the integers mod  $n$  gets all  $r$  colors. The  $S$ - $n$ -polychromatic number  $p(S,n)$  is the largest integer  $r$  such that there exists an  $S$ - $n$ -polychromatic coloring with  $r$  colors. We determine  $p(S,n)$  for all  $n$  for all sets  $S$  of size 3 and some sets of size 4. For example, it is easy to see that if  $S = (0,1,2,k)$  where  $k$  is congruent to 3 (mod 4) and  $n$  is divisible by 4, then  $p(S,n)=4$ . Otherwise, if  $k$  equals 4 or 5 then  $p(S,n)=2$  if  $n$  is not divisible by 3, whereas if  $k>5$  then  $p(S,n) = 3$  for all sufficiently large  $n$ . There are connections with a conjecture of Bollobas, Janson, and Riordan about the minimum density of a complement set in the integers for a finite set  $S$  of integers. (Received July 16, 2019)