

Let  $k$  be a positive integer. Find the smallest positive integer  $n$  for which there exist  $k$  nonzero vectors  $v_1, \dots, v_k$  in  $\mathbb{R}^n$  such that for every pair  $i, j$  of indices with  $|i - j| > 1$  the vectors  $v_i$  and  $v_j$  are orthogonal.