

Problem 5: Color Thy Numbers

There are over 16 million ways to give each of the integers 1 thru 24 one of two colors. A *proper coloring* occurs when all 24 numbers are colored so that for every integer d , every sequence of even length of the form $d, 2d, 3d, \dots$ has an equal number of each color. Find such a coloring or show that no such coloring exists.

As always, show your work, fully explain and justify your answer. A solution mainly obtained by computers or calculators, or answers without proper justification will not be accepted.

Posting Date 10/21/2018. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 (e-mail or hard-copy, but hard copy submissions must include a time stamp) by 4 pm on 11/4/18.