

Size

EGMOTC 2023 - Rohan

December 24, 2023

If you are done with the uploaded pset, try the following problems:

Problem 1

Some divisors: Determine all composite integers $n > 1$ that satisfy the following property: if d_1, d_2, \dots, d_k are all the positive divisors of n with $1 = d_1 < d_2 < \dots < d_k = n$, then d_i divides $d_{i+1} + d_{i+2}$ for every $1 \leq i \leq k - 2$.

Problem 2

Fun with poly: For each integer $k \geq 2$, determine all infinite sequences of positive integers a_1, a_2, \dots for which there exists a polynomial P of the form

$$P(x) = x^k + c_{k-1}x^{k-1} + \dots + c_1x + c_0,$$

where c_0, c_1, \dots, c_{k-1} are non-negative integers, such that

$$P(a_n) = a_{n+1}a_{n+2} \cdots a_{n+k}$$

for every integer $n \geq 1$.