

Problem 2: Degree of a Polynomial

Determine all positive integers n for which there is a polynomial of degree n with real coefficients satisfying all of the following conditions

1. $P(k) = k$ for all integers $k = 1, 2, \dots, n$.
2. $P(0)$ is an integer.
3. $P(-1) = 2019$.

As always, show your work, fully explain and justify your answer. A solution mainly obtained by computers or calculators will not be accepted.

Posting Date 1/19/2020. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 (e-mail or hard-copy, but hard copy submissions must include a time stamp) by 5 pm on 1/31/2020.