

Problems 02

Due: Friday, 20 January 2023 before 17:00 EST

P2.1. The sequence of *square triangular numbers* is defined by $N_0 := 0$, $N_1 := 1$, and,

$$N_k := 34N_{k-1} - N_{k-2} + 2 \quad \text{for all } k \geq 2.$$

The first few terms are 0, 1, 36, 1 225, 41 616, 1 413 721, 48 024 900, 1 631 432 881, ...

Verify that $N_{k-1}N_{k+1} = (N_k - 1)^2$ for all $k \geq 1$.

P2.2. Establish the cancellation law for addition: for any three nonnegative integers k , m , and n , show that the equation $m + k = n + k$ implies that $m = n$.

P2.3. Demonstrate that any nonempty subset of the nonnegative integers that is bounded above has a unique greatest element (with respect to \leq).