Problem of the Block - Block 4

Square Permutations

Consider the numbers $\{1, 2, 3\}$ and their rearrangement $\{3, 2, 1\}$. Adding these two lists together termwise give $\{4, 4, 4\}$, nothing but the square number 4.

Adding $\{1, 2, 3, 4, 5\}$ to the rearrangement $\{3, 2, 1, 5, 4\}$ gives $\{4, 4, 4, 9, 9\}$, nothing but the square numbers 4 and 9.

Question 1. For what values of N from 1 to 20 is there some rearrangement of $\{1, 2, 3, 4, \ldots, N\}$ so that adding the two lists termwise gives nothing but square numbers. ($N = 3$ and $N = 5$ have been done for you).

Question 2. Can you generalize this result for numbers N beyond $N = 20$?

Turn in solutions to Dr. Bean in Law 206E. Hard copies only please. *Do not send electronic copies.* You may ask any Mathematics and Statistics faculty member about the questions, but Dr. Bean wrote them (and therefore at one time at least knew the answer to them) so that might be your best bet.

Solutions for only one/some questions or partial solutions will receive credit (and are encouraged!). Submitting solutions for the Problem of the Block can earn culture points toward the major in mathematics.

For more information about the Problem of the Block, including the current leader board for the yearly competition, and to print off your own copy visit http://www.cornellcollege.edu/mathematics/problem-of-the-block/index.shtml.