Challenge 191: Prime Reasoning

Dr Reasoner (see challenges 160 and 173) has come up with a prime puzzle to promote logical thinking: If n is a positive integer, and all of n, $n^2 + 1$ and $n^3 + 3$ are prime, what is the value of n?

She thinks it is possible to write a good solution to the puzzle in only a couple of lines. Is she right? Can you come up with such a solution?