Test Flight Q6

A classic unsolved problem in number theory asks if there are infinitely many pairs of ‘twin primes’, pairs of primes separated by 2, such as 3 and 5, 11 and 13, or 71 and 73. Prove that the only prime triple (i.e. three primes, each 2 from the next) is 3, 5, 7.

One definition of a prime number is that it is only divisible by itself and 1.

The definition of an even integer is $n = 2k$ for $k \in \mathbb{Z}$. For all even integers > 2, they are divisible by 2 in addition to itself and 1. This violates the definition of a prime number. Therefore even integers > 2 are not prime.

Prime triplets as defined in the problem are three prime numbers with a gap of 2 between each prime.

Since each prime is separated by a gap of 2, the three primes need to also be three consecutive odd integers.

It is known that for three consecutive odd integers > 3, one will be divisible by 3. Therefore any sequence of three consecutive odd integers will contain one which is divisible by 3 and therefore violates the definition of a prime number. Therefore there can not be any prime triplets greater that (3,5,7).