TWIN PARADOX

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ABSTRACT

A humble attempt is made at proving the twin prime conjecture. An argument involving a form derived from a set of characteristic equations and a parity argument is used in the proof.

It was shown by the author in his paper "The Characteristics of the Primes", http://**viXra.org/abs/1604.0321 page 10** that

$$\pi_2(n) = f(n) + \pi(n) + \pi(n+2) - n - 1$$

where $\pi_2(n)$ is the twin prime counting function, $f(n)$ is the number of twin composite $\leq n$ and $\pi(n)$ is the prime counting function.

Theorem:

There are an infinite number of primes for which the difference $p_{n+1} - p_n = 2$ holds.

Proof:

In order for the Twin Prime Conjecture to be false, the twin prime counting function $\pi_2(n)$ must become constant for sufficiently large n. If we evaluate the above equation at the prime number sequence p_n, we obtain

$$\pi_2(p_n) = f(p_n) + \pi(p_n) + \pi(p_n + 2) - p_n - 1.$$

Now for exploration purposes, we may assume the twin prime conjecture to be false and set the twin prime counting function to a constant c

$$c = f(p_n) + \pi(p_n) + \pi(p_n + 2) - p_n - 1$$

Now noting that the prime counting function $\pi(n)$ at the prime number sequence p_n is simply n and that if there are no more twin primes, than the prime counting function must have the same value at $p_n + 2$ as it does at p_n, we can simplify this as

$$c = f(p_n) + n + n - p_n - 1.$$

Now combining like terms and adding 1 to both sides, which will change the constant c to a new constant C, therefore gives us

$$C = f(p_n) + 2n - p_n.$$

This may of course be algebraically rearranged as

$$p_n - f(p_n) = 2n - C.$$

Now we know that the prime number sequence is odd for $n > 1$ and that $2n$ is clearly even. We don't know what the constant is, but we do know that on the right side of the equation, if the constant is an even number, than the right side must always be even. If the constant is an odd number, than the right side of the equation must always be odd. So $2n - c$ can only have one parity. However, the left side of the equation will have both even and odd parity several times over. This is because the number of twin composites $\leq n$, $f(n)$ takes on both odd and even values. This is a paradox in the parity of both sides of the equation which implies that the Twin Prime Conjecture cannot be false and therefore, must be true. ■

This is a humble attempt at a solution and I leave it to the mathematical community to confirm.