Rebuttal of Paper by Matthias Lesch, 13 September 2014, Vixra 1408.0195v2

Stephen Marshall

11 December 2014

Abstract

This paper presents a complete rebuttal of the paper Vixra 1408.0195v2 posted by Matthias Lesch on 13 September 2014. This rebuttal is in response to Vixra 1408.0195v2 where Matthias Lesch erroneously attempted to disprove six papers I published proving several conjectures in Number Theory. Specifically, these were papers Vixra:1408.0169, 1408.0174, 1408.0201, 1408.0209, and 1408.0212. This rebuttal paper is presented in the same format as Vixra 1408.0195v2 with necessary quotes from paper Vixra 1408.0195v2 to clarify rebuttals.

1. The papers vixra:1408.0169, 1408.0174, 1408.0201, 1408.0209, and 1408.0212

Quote from Vixra 1408.0195v2: *"No less than five times the author reproduces exercise 161 of the book [Reference 1], where the solution on page 136 in loc. cit. is copied verbatim".* **Correction:** All of my papers have been updated to only include only references to [Reference 1] and credit to the authors.

Quote from Vixra 1408.0195v2:
"*(1.1)*

$$n(p,d) = (p-1)!\left(\frac{1}{p} + \frac{(-1)^{d} d!}{p + d}\right) + \frac{1}{p} + \frac{1}{p+d}$$

Then p and p + d are both primes if and only if n(p; d) is an integer.

Multiplying Eq. (1.1) by p(p + d) we find for any pair of integers p > 1; d > 0 that

(1.2) $n(p, d) . p(p + d) = (p - 1)!(p + d + (-1)^d d!p) + 2p + d$

In particular, the right hand side and hence both sides of this equation are integers. In the papers listed in the title to this section (e.g. vixra:1408.0169, p. 7, vixra:1408.0174, p. 7) it is erroneously concluded that if Eq. (1.2) holds for integers p > 1; d > 0 and a rational number n then n must be an integer. This is obviously not true as we know from Eq. (1.1). Take p = 3; d = 3 then p + d is not prime and by Eq. (1.1) n(p; d) is not an integer." **Rebuttal:** First the author would like to thank Mr. Lesh for his comments which revealed that I needed to update my proofs to make them clear to the reader. Both of these papers (vixra:1408.0169, p. 7, vixra:1408.0174, p. 7) have been updated to make it clear that these papers were only proving that at least one n must be an integer, not that all n must be an integer. It suffices to prove that at least one n is an integer because then at least one p + d is prime. Only one p + d must be proven to be prime (which is true if n is an integer) to prove infinitude, because this same proof can be repeated an infinite number of times to adding at least one more prime number to the assumed finite set. As to the example "*Take p = 3; d = 3 then p + d is not prime and by Eq. (1.1) n(p; d) is not an integer.*", this is an erroneous example, of course when p = 3 and d = 3 then p + d is not prime because n ≠ integer, therefore, according to Eq. (1.1) p and p + d cannot both prime since n ≠ integer.

1.α. The paper vixra:1408.0169 on Fibonacci primes

Quote from Vixra 1408.0195v2: "*Using only the identities Eq. (1.1), (1.2) the author arrives at the conclusion that p + d must be prime. The paper therefore proves a much stronger statement which is obviously wrong, namely that for given p > 1; d > 0 the sum p + d is automatically prime."* **Rebuttal:** Mr. Lesh makes the same erroneous conclusion again, I have updated this proof as well to make it clear that vixra:1408.0169 is only proving that at least one n must be an integer, not that all n must be an integer. It suffices to prove that at least one n is an integer because then at least one p + d is prime. Again, it suffices to prove that at least one n is an integer because then at least one p + d is prime. Only one p + d must be proven to be prime (which is true if n is an integer) to prove infinitude, because this same proof can be repeated an infinite number of times to adding at least one more prime number to the assumed finite set.

1.β. The paper vixra:1408.0174 on Polignac's conjecture

Quote from Vixra 1408.0195v2: "*Starting on page 6 in vixra:1408.0174 it is seemingly shown that for given k _ 1and a prime p then also p+2k is prime. There are many obvious counterexamples to this.*" **Rebuttal:** Mr. Lesh makes the same erroneous conclusion again, I have updated this proof as well to make it clear that vixra:1408.0169 is only proving that at least one n must be an integer, not that all n must be an integer. It suffices to prove that at least one n is an integer because then at least one p + d is prime. Again, it suffices to prove that at least one n is an integer because then at least one p + d is prime. Only one p + d must be proven to be prime (which is true if n is an integer) to prove infinitude, because this same proof can be repeated an infinite number of times to adding at least one more prime number to the assumed finite set.

2. The paper vixra:1408.0173 on Beal's conjecture

Quote from Vixra 1408.0195v2: "*In top of page 3 of vixra:1408.0173 a proof by contradiction is attempted. However, the author fails to formulate the negation to Beal's conjecture in a correct way. Namely, it is said that if we have a solution to Eq. (2.1) with positive integers A; B; C and positive integers x; y; z > 2 then A; B;C cannot have a common prime factor. Well, for this to disprove it suffices to give one counterexample, e.g.* $3^3 + 6^3 = 3^5$*.*" **Rebuttal:** Again, Mr. Lesh jumps to a wrong conclusion, by his own admission to not reading the rest of the paper at this point. Mr. Lesh concludes that an inadvertent miss wording automatically makes this proof of Beal's Conjecture wrong without reading the rest of the paper, this is indeed a grave error to discredit a colleague without even reading his paper. I have simply changed the wording from "*A; B;C cannot have a common prime factor*" to "A; B;C does not always have a common prime factor" and the proof is fully correct.

Quote from Vixra 1408.0195v2: "*This is really a far reaching conjecture which obviously implies Fermat's Last Theorem. Since no elementary proof of Fermat's Last Theorem is*

known yet, an elementary proof of Beal's conjecture would be a major breakthrough."
Rebuttal: Although Mr. Lesh intends this comment as negative, implying the author does not have the ability to have a major breakthrough in number theory, I couldn't agree with him more that this elementary proof of Beal's conjecture is a major breakthrough. Additionally, my proof of Polignac's conjecture is a greater breakthrough.

3. Conclusion

Quote from Vixra 1408.0195v2: "*In light of this it is my opinion that the six papers are wrong and the conjectures are still open*." **Rebuttal:** I have addressed all of Mr. Lesh's erroneous errors and have shown that the conjectures have indeed been proven and are no longer open.

References:

1) *1001 Problems in Classical Number Theory, Jean-Marie De Koninck and Armel Mercier, 2004, Exercise Number 161*
1) *Comments on recent papers by S. Marshall claiming proofs of several conjectures in number theory, Matthias Lesch, 13 September 2014*