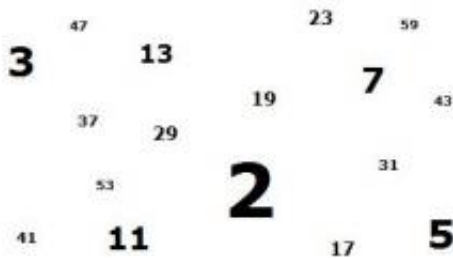


Mathematician proves there are infinitely many pairs of prime numbers less than 70 million units apart

May 15 2013, by Bob Yirka



Prime Numbers

(Phys.org) —Mathematician Yitang Zhang of the University of New Hampshire, appears to have taken a major step in solving the twin prime conjecture. He's come up with a mathematical proof that shows that the number of pairs of prime numbers that exist that are less than 70 million units apart is infinite. His proof is currently under review for publication in the journal *Annals of Mathematics*.

The twin prime conjecture has puzzled mathematicians for nearly as long as they have known of the existence of [prime numbers](#) ([whole numbers](#) divisible by themselves and one)—going all the way back to Euclid. An interesting aspect of prime numbers is they come farther and farther apart as more are found—except sometimes, they

don't—sometimes instead, they come in pairs: 11 and 13 for example, or 41 and 43. The twin prime conjecture states that there are infinitely many pairs, but no one has been able to prove it. The closest anyone has come is when a team of three mathematicians demonstrated back in 2005 that the number of prime pairs that differ by only 16 units is infinite. The problem there was that it was based on another unproven conjecture.

In this new work, Zhang has shown, using nothing but standard [mathematical techniques](#) that the number of pairs of prime numbers that exist that are 70 million units apart, or less, is infinite—sans unproven conjecture. Mathematicians note that 70 million might seem like a lot to those outside the field, but inside the field, it's a tremendous breakthrough. This is because it proves that the size of the stretches between pairs doesn't keep growing larger forever—a baseline exists—a baseline that could very well be reduced to a smaller number, though no one is yet suggesting it might ever come down to just 2.

Zhang has said in interviews that the idea for his proof came to him while he was visiting with a friend last summer. He's been working on it ever since. And now that he's made his proof public, other [mathematicians](#) have been reviewing it as well, and thus far, no one has spotted any problems with it.

More information: via *Nature* [doi:10.1038/nature.2013.12989](https://doi.org/10.1038/nature.2013.12989)

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Citation: Mathematician proves there are infinitely many pairs of prime numbers less than 70 million units apart (2013, May 15) retrieved 31 January 2023 from <https://phys.org/news/2013-05-mathematician-infinitely-pairs-prime-million.html>

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