The Russell Paradox, Fermat's Last Theorem, and the Goldbach conjecture

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Fermat's Last Theorem (Proof)

Goldbach Conjecture (Concise Proof)

Goldbach Conjecture (Expanded)

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"A barber shaves all those and only those in a village who don't shave themselves. Does the barber shave himself?" – Bertrand Russell

This statement of the paradox is a very clever characterization of Goldbach's conjecture.

Consider the result of the proof of the Goldbach conjecture on unit bases, so that

$c^2 + v^2 = 2cv$, where all elements are prime numbers. Then if the act of shaving is characterized as multiplication on the rhs, then the left hand side characterizes the additive existence of the interacting elements in the equation.

Then if the barber B and the villager V shave themselves, the start off in life as $c = \sqrt{B}$ and $v = \sqrt{V}$,

So that if they shave themselves then $B = c^2$ and $V = v^2$ Then the total count C of the barber(s) and villager(s) is $C = L = c^2 + v^2$ which also can be thought of as a length partitioned by c^2 and v^2 as counts of unit elements in the length. (In Russell's paradox, there is only one barber).

The action of shaving each other is characterized by the product by
$C = L = 2BC = BC + CB = (vc + cv) = 2vc$

1. If the barber shaves himself, and the villager doesn't shave himself, then $v^2 = 0$, so that $v = 0$ and the villager does not exist $c^2 = 2cv$. This means that the barber can't shave him, so there is no interaction, and $cv = 0$ so that $c^2 = 0$ and the barber doesn't exist either.
2. If the barber doesn't shave himself and the villager doesn't shave himself, then $c^2 = 0$ and $v^2 = 0$, and $c = v = 0$. Since neither the barber or the villager exists, there can be no interaction between them, and $cv = 0$.

Since nobody exists, nobody can shave (or not shave) themselves or each other, least of all the barber…..

If the barber doesn't shave himself AND the villager doesn't shave himself then both b=0 and v=0 on the l.h.s, so 0=2vc so that (vc)=0
(That is, nobody shaves anybody since nobody exists, so the interaction (cv) zero.

That is, neither the barber(s) or the villager(s) exist, so nobody can shave anybody.

If there is no interaction between the barber or the villager, then of the result (the resultant), but the barber(s) continues shaving the villagers who don't shave themselves (as well as himself, then the expression becomes

$0=(x-y)^2=x^2+y^2-2(x)y$, so that $x^2+y^2=2(x)y$

This result is only valid for $x^2+y^2=2(x)y$, where x indicates that the barber shaves himself as well as the villagers that don't shave themselves, the barber is not a villager, so can't be "in the village" ($x\in\{y\}$), and this result cannot be observed.

Goldbach's conjecture

If x and y are prime numbers, then so are x^2 and y^2 , so that x^2+y^2 is the sum of two primes, and so is $x+y$. Then xy is a real number, so $r=\pm 2xy$ is an even real number. This proves Goldbach's conjecture for the general case where x and y represent independent axes, and they can be positive or negative. That all real numbers are included on the r.h.s. (and not just primes) requires parametrizing $x=c\tau$ and $y=c\tau'$ as in Goldbach Conjecture (Proof).

Therefore, the prime numbers x^2 and y^2 must reside on the x and y axes uniquely, where $x=1$ in the case of the barber paradox, so that

$1^2+y^2=2y$ and $y^2-2y+1^2=0$

Then $ay^2-by+1^2=0$, where $a=1,b=-2,c=1^2$

so that $y=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{2\pm\sqrt{(4-4)1^2}}{2}=1$

Therefore, there must be only one villager who doesn’t shave himself and no cases where the villager shaves himself. The barber cannot be a villager, much less shave anyone, since he doesn’t exist.

(In order to exist, he would have to be able to both shave himself and not shave himself, so there must be at least two barbers, neither of whom can reside in the village.