Prime Numbers and Goldbach's conjecture

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The Relativistic Unit Circle

Let $c, a_i \in |\mathbb{Z}|$ (e.g. $a_i \triangleq \left(\sqrt{a_i}\right)^2$ and $c \triangleq \left(\sqrt{c}\right)^2$ positive definite integers)

Consider the expression $c = a + b = a_1 + a_2$. If $\{c\} \triangleq \{1+1....+1\}_c = c \times 1$, then c is an invariant no matter how the set is partitioned in terms of its two subsets $a \triangleq \{1+1+...1\}_a = a \times 1$ and $b \triangleq \{1+1+...1\}_b = b \times 1$.

Quick Proof of Fermat's Last Theorem (all numbers positive definite)

1. $c = a + b$ (Pressburger Arithmetic)
2. $c^n = a^n + b^n + \mathrm{Re}\, m(a,b,n)$ (Binomial Expansion)
3. $c^n = a^n + b^n \Leftrightarrow \mathrm{Re}\, m(a,b,n) = 0$
4. $\mathrm{Re}\, m(a,b,n) > 0$
5. $\therefore c^n \neq a^n + b^n$
6. Q.E.D.

Quick proof of Goldbach's conjecture (with caveat)

1. Every positive definite number $|c|>1$ can be partitioned into a sum of two integers a and b $c=a+b$
2. By the Binomial Expansion $c^2=(a+b)^2=a^2+b^2+2ab$
3. c^2 cannot be divided by a or b , but only by the sum $c=\left(a+b\right)$

Let $c^2=0$

This solution has two possibilities:

1. $a=b=0$
2. $0^2=a^2+b^2-2ab$ so that $a^2+b^2=2ab$

Note that in the second case, b must be imaginary, since

$a^2+b^2=\left(a+ib\right)\left(a-ib\right)$ so that for this case $c^2=0\Rightarrow a^2+b^2=2ab$

By the Fundamental Theorem of Arithmetic, this must be equal to

$L=a^2+b^2=2ab=2N$ so that $\frac{L}{2}=\frac{a^2+b^2}{2}=ab=N$.

By the Fundamental Theorem of Arithmetic, N is uniquely expressible as the product of two primes, a and b . If a is prime, then so is a^2 and the same for b and b^2

Therefore, for $\frac{L}{2}=\frac{1}{2}(a^2+b^2)=ab$, every even number $L=(a^2+b^2)=2ab=2N$ is the sum of two primes a^2 and b^2 where $N=ab$ is the product of the two primes a and b .

However, this relation is true only if b is imaginary, so that $b^2=b^2=\left(i^2b^2\right)=-b^2$, which is inconsistent with the rules of arithmetic.

Therefore, this expression is undecidable (unproveable) according to Goedel's Theorem, since its expression depends on the logarithmic base of the expression

(e.g., to the base 10: $30=27+3=2\left(3*5\right)$, so examples exist for that base, but may not be true in other bases, so that individual cases must be determined by inspection for that base.)

However, in the parameterized example:

$$c\tau' = c\tau + v\tau'$$
$$(c\tau')^2 = (c\tau)^2 + (v\tau')^2 + 2(c\tau)(v\tau')$$

Defining the subset relations $(c\tau)^2 + (v\tau')^2 = 2(c\tau)(v\tau')$ does not imply that $(c)^2 \vee (\tau')^2 = 0$ but simply that the product $\{(c\tau') \in |\mathbb{Z}|\} \notin |2N| \in |\mathbb{Z}|$ is excluded from the set $\{2N\} \in |\mathbb{Z}|$; that is,

(i.e., interactions $(c\tau')$ between c and τ' are excluded from the subset positive products where $\{\{c\tau'\},\{c\tau\},\{v\tau'\}\} \in |\mathbb{Z}|$, but all variables are complete $\{c,\tau,v,\tau',L,N\} \in |\mathbb{Z}|$)

In particular, $(c\tau')^2 \notin 2N$, so must be an odd number, and therefore $(c\tau')$ must be an odd number.

The sets of positive odd $\{c\tau'\}$ and even $\{2N\}$ numbers are complete in $|\mathbb{Z}| = (c\tau') \cup (2N)$

$$\left\{p_1 = \left(\sqrt{(c\tau)^2}\right), p_2 = \left(\sqrt{(v\tau')^2}\right)\right\} \in |\mathbb{Z}|$$
$$\left\{p_1 = \sqrt{(c\tau)^2}, p_2 = \sqrt{(v\tau')^2}\right\} \in |\mathbb{Z}|$$

For all $p_i > 1$, the sums $L = \sqrt{(p_1)^2} + \sqrt{(p_2)^2} \in |\mathbb{Z}|$ and products $N = (p_1 p_2) \in |\mathbb{Z}|$

In particular, note that $1^2 + 1^2 = 2(1^2)$ and that $p_1 = p_2 \Leftrightarrow (p_1)^2 + (p_2)^2 = 2(p_1)^2$

Therefore, Goldbach's conjecture is proven by defining $(c\tau')^2$ as odd and $(c\tau)^2 + (v\tau')^2 = 2(c\tau)(v\tau')$ (where L is always even, but N can be either odd or even), so $|\mathbb{Z}|$ is complete in odd and even integers, but removing their interaction $(c\tau')^2$ defines them as prime (not interacting, and therefore countable).

Interpretation (11/18)

However, time and space are ultimately irrelevant in this context; rather, t and t' appear as scaling factors on mass where m(c) = ct, m(v) = vt', m(c') = ct' and (ct)^2 is an initial state (v=0), (vt')^2 is a perturbing field state, and (ct')^ is the final state (v=0 again), related in second order by (ct)^2 = (ct + vt')^2 = (ct)^2 + (vt')^2 + 2(ct)(vt')

Here h^2 = 2(ct)(vt') where "spin" (def) S = sqr[{(ct)(vt')}^2] so that S = h/sqr(2) in Cartesian coordinates. Radial coordinates is then responsible for using h-bar.

Note: My proof of Goldbach's conjecture shows that L = p1^2 + p2^2 = 2p1p2=2N for prime numbers under addition and multiplication shows that "Spin" and "waves" do not interact. The interpretation is that "space time" is irrelevant, but particle count (wave number) is preserved. so that 2N is modeled as a source-sensor, and L is the Maxwell solution as "waves", but neither exist simultaneously. Rather, there is a "source"(hv, quantum) which transforms "instantaneously" to waves across Maxwell's displacement length (c=1/sqr(eu), and then transforms back into a "sensor" (qm). I.e., the "waves" do not interact with the source/sensor when not being absorbed, emitted if particle count/wavenumber is conserved)

However, if one wants to (imagine)/interpret the waves as taking a certain time to travel the displacement length (as Maxwell does) that is up to the observer.

But it doesn't mean the waves still exist when the source/sensor are taken into account, provided that particle count is conserved. The Special Theory is a characterization of initial, perturbing, and final states as a linear system; including the interaction makes it non-linear; the link to quantum mechanics is the link Et = h/t = hv, but the source doesn't exist at the same time as the sensor or the waves for particle count ("normalization" in quantum mechanics)

Remember, you saw it here first... :)

(Note that this analysis is only valid for 2nd order (non) interactions (n=2 in "Fermat's" equation)

"(Relativity, Proof of Fermat's Theorem)"]

These proofs can be extended by inspection to the Multinomial Expansion to all orders and sums of (powers of) positive definite integers via the Fundamental Theorem of Arithmetic.

(For Pythagorean triples, one of the numbers must be imaginary: $\psi = a + ib$, so that

$\psi\psi^* = (a+ib)(a-ib) = a^2 + b^2$.

For radial coordinates, $\pi c^2 = \pi a^2 + \pi b^2 + (2\pi a)b = \pi a^2 + \pi b^2 + (C_a)b$, where C_a is the circumference of circle with radius a and b is the radius of circle b so that $2ab$ is the interaction between the two circles at the intersection of their circumference and radius, as opposed to "Cartesian" coordinates (not multiplied by π where the interaction is at the center of the RUC. In physics, $h^2 \triangleq 2ab \triangleq 2S^2$, where S is the spin of an electron and h is Planck's constant, so that $S = \frac{h}{\sqrt{2}}$.

Note that for $c^2 = 0$, $0 = a^2 + b^2 - 2ab$, so that $a^2 + b^2 = 2ab$ and in particular,

$\pi a^2 + \pi b^2 = (2\pi a)(b) = (b)C_a$

Consider the expressions from the Relativistic Unit Circle (RUC):

$\varphi = (c\tau') = (c\tau) + (v\tau') \in |\mathbb{R}|$

$(c\tau')^2 = (c\tau)^2 + (v\tau')^2 + 2(c\tau)(v\tau') \in |\mathbb{R}|$

$\left(\frac{v}{c}\right) \triangleq \beta, \left(\frac{\tau'}{\tau}\right) \triangleq \gamma$

$\gamma > 1,\ \gamma^2 > 1^2$

$\frac{(c\tau')^2}{(c\tau')^2} = (1)^2 = \left(\frac{1}{\gamma}\right)^2 + (\beta)^2 + 2\frac{(1)}{\gamma}(\beta) \in |\mathbb{R}|$

Definition of prime numbers (11/09)

In order to define prime numbers, the prime number must be parameterized so that multiplication and (and therefore division) can be defined, where $p_i = c_i\tau_i$. If there is no change to the equation

$(c\tau')^2 = (c\tau)^2 + (v\tau')^2 + 2(c\tau)(v\tau')$ in any of its constituents, then consider the difference $\{0\}^2 = (c\tau)^2 + (v\tau')^2 - 2(c\tau)(v\tau')$, where the product $(c\tau')^2$ characterizes a change in the product parameters, so that $(c\tau')^2 = 0$ means there is no change when comparing the squared sums $(c\tau)^2 + (v\tau')^2$ and the product $(c\tau)^2 + (v\tau')^2$.

Then $(c\tau)^2 + (v\tau')^2 = 2(c\tau)(v\tau')$, where $(c\tau)^2 \neq (c\tau)$ (etc.) because
$2 = \log_{(c\tau)}(c\tau)^2 \neq 1 = \log_{(c\tau)}(c\tau)^1$

Then $(c\tau)^2$ must be a prime number, since the product by any other number $(v\tau')^2$ means that $(c\tau)^2(v\tau')^2 = 0$ since either $c = 0$ or $\tau' = 0$, and the same condition true for all the terms in the defining equation. Note that if $p^2 = (c\tau)^2$ is a prime number, then so is p, and thus so is $p = c\tau$ and $\sqrt{p} = \sqrt{c\tau}$ and that in general $p = \sqrt[n]{p^n}$ for any number defined as prime, and in particular, $p = \sqrt{p^2}$ so the numbers in the above equation are primes under both addition and multiplication.

In particular, c and t range over all values , so that the equation $p_{c\tau} = \left(\sqrt{c}\right)^2\left(\sqrt{\tau}\right)^2 = c\tau$, and therefore one can set $c = \tau = p$ for some combination in $|\mathbb{R}|$, so that $p = \left(\sqrt{p}\right)^2\left(\sqrt{p}\right)^2 = c\tau$ and the same for the other terms, where the internal parameters are all different, and the numbers are therefore prime in each instantiation. Therefore, the expression is complete in $|\mathbb{R}|$, and therefore is true for all numbers in $|\mathbb{R}|$.

Then for all single valued integer functions satisfying this condition,

$(f(1))^2 + (g(1))^2 = 2f(1)g(1)$ where the functions have been referred to their unit bases, and all numbers are prime.

Goldbach's Conjecture

$\therefore$ Every even number is the sum of two primes. Q.E.D

In terms of covariance $(2\beta\gamma)$ and contravariance $2\left(\frac{\beta}{\gamma}\right)$ the result is:

$\left(\frac{1}{\gamma}\right)^2 + \beta^2 = 1^2 + (\beta\gamma)^2 = 2\left(\frac{\beta}{\gamma}\right) = 2\beta\gamma$, which is valid only for $(ct')^2 = 0$ and $v^2 = v^2 = 0$

so the definition of a tensor $k = (1 + r + s)$ (the count of covariant r and contravariant s elements is inconsistent, since the count is either 1 or $r + s$, but not both. (If $v \neq 0$ there is either interaction (which "contracts" (via inner product) or "expands" (via outer product) the tensor one way or the other, since an element cannot radiate and absorb at the same time), or $v^2 = 0^2$ (i.e., 1^2 in which case nothing has happened).

(from previous work.. will edit shortly)

Then any prime number can be defined as

$$\{0\}^2 = (c\tau)^2 + (v\tau')^2 - 2(c\tau)(v\tau') \in |\mathbb{R}|$$

$$(c\tau)^2 + (v\tau')^2 = 2(c\tau)(v\tau') \in |\mathbb{R}|$$

$$c = \tau = \sqrt{p_1}$$

$$v = \tau' = \sqrt{p_2}$$

$$c\tau = p_1$$

$$v\tau' = p_2$$

$$p_1 + p_2 = 2(p_1)(p_2) \in |\mathbb{R}|$$

$$\log_{c\tau}(c\tau)^2 = \log_{v\tau'}(v\tau')^2 = 2$$

$$\log_{c\tau}(c\tau) = \log_{v\tau'}(v\tau')^2 = 1$$

$$p_1 \neq p_1$$

$$p_2 \neq p_2$$

Then for $v \neq 0$:

(Absorption, $v > 0$)

$$\beta > 1, \gamma > 1$$
$$(\beta\gamma)^2 > \beta\gamma > 1$$

$$\frac{\beta}{\gamma} < 1 \Rightarrow \frac{\beta}{\gamma} \neq 1 \quad \beta\gamma \neq 1 \text{ and } \beta\gamma > 1 \Rightarrow \beta\gamma \neq 1$$

Prime Numbers

$$i = 1, j = 2, \ i \neq j$$
$$c_i \triangleq \left(\sqrt{c_i}\right)^2 = |c_i| \ni |\mathbb{R}|$$
$$\tau_i \triangleq \left(\sqrt{\tau_i}\right)^2 = |\tau_i| \ni |\mathbb{R}|$$
$$p_i \triangleq \sqrt{(p_i)^2} = |p_i| = \sqrt{(c_i)^2 (\tau_i)^2} = (c_i \tau_i) \ni |\mathbb{R}|$$
$$p_j \triangleq \sqrt{(p_j)^2} = |p_j| = \sqrt{(c_j)^2 (\tau_j)^2} = (c_j \tau_j) \ni |\mathbb{R}|$$

Multiplication (2 Primes)

$$p_1 = c_1 \tau_1 = \beta_1 \gamma_1$$
$$p_2 = c_2 \tau_2 = \beta_2 \gamma_2$$

(Absorption)

$$p_1 p_2 = \sqrt{(p_1)^2 (p_2)^2} = \sqrt{(p_1 p_2)^2} = \left(\sqrt{(p_1 p_2)}\right)^2$$
$$N \triangleq p_1 p_2$$

From the RUC, note that $\cosh\theta = \gamma, \ \sinh\theta = \beta$ for two separate triangles, so that

$$\left(\sqrt{\gamma_1}\right)^2 \left(\sqrt{\beta_1}\right)^2 + \left(\sqrt{\gamma_2}\right)^2 \left(\sqrt{\beta_2}\right)^2 = 2\gamma\beta$$
$$\gamma_1 \beta_1 + \gamma_2 \beta_2 = 2\gamma\beta$$
$$(\cosh\theta_1)(\sinh\theta_1) + (\cosh\theta_2)(\sinh\theta_2) = 2(\cosh\theta_1)(\sinh\theta_1)$$

Consider the expression:

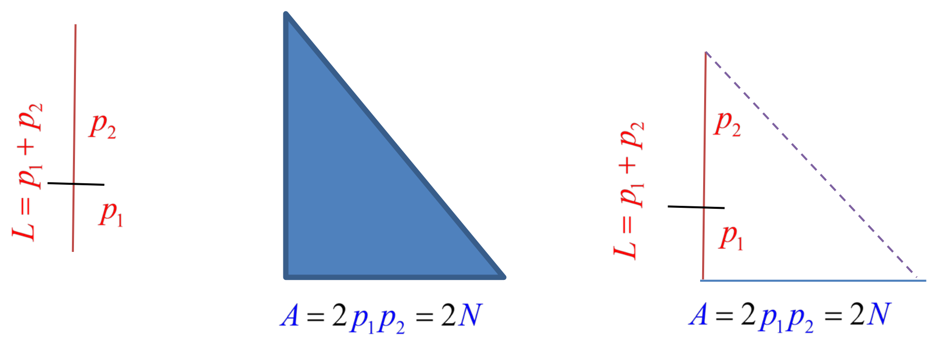
$$1=\left(\sqrt{\cosh\theta}\right)^2-\left(\sqrt{\sinh\theta}\right)^2=\left|\cosh\theta\right|-\left|\sinh\theta\right|$$

Setting $\{0\}=\left|\cosh\theta\right|-\left|\sinh\theta\right|$ so that $\left|\cosh\theta\right|=\left|\sinh\theta\right|=1$ implies that they are orthogonal, so two independent bases are defined, such that

$$.\{0\}\triangleq\left[\left(\sqrt{c\tau}\right)^2+\left(\sqrt{v\tau'}\right)^2\right]-\left[2\left(c\tau\right)\left(v\tau'\right)\right]$$

where the “ – “ means that both sides of the equation are equal, NOT that they are both equal to zero, so that

$\left[\left(p_1\right)+\left(p_2\right)\right]=\left[2\left(p_1\right)\left(p_2\right)\right]$, and the “length” on the l.h.s. is equal to t he “area” on the r.h.s.



Then

$$\begin{aligned} a&=L=p_1+p_2\\ b&=2N\\ c^2&=a^2+b^2 \quad ,\\ c&=\sqrt{L^2+(2N)^2} \end{aligned}$$

$$\left[L\triangleq\left(\sqrt{c\tau}\right)^2+\left(\sqrt{v\tau'}\right)^2=p_1+p_2\right],\left[N\triangleq\left(c\tau\right)\left(v\tau'\right)\right]\in\left|\mathbb{R}\right|$$

$$L=2N\in\left|\mathbb{R}\right|$$

$$L=2N$$

Note that $\left[(p_1)^n + (p_2)^n\right] = \left[2(p_1)(p_2)\right]$ and $\left[(p_1)^m + (p_2)^n\right] = \left[2(p_1)(p_2)\right]$ can be equal by the Fundamental Theorem of arithmetic.

Furthermore, if $(p_1)^m$ and $(p_2)^n$ are themselves products of primes, then their common primes can be factored out so that

$$p_f\left[(p_1)^{m'} + (p_2)^{n'}\right] = \left[2(p_1)(p_2)\right] = \left[2p_f(p_1)(p_2)\right],$$

where p_f is a product of the common primes of $(p_1)^m$ and $(p_2)^n$ and this number is also a common multiplicative factor in the product $\left[2p_f(p_1)(p_2)\right]$, so that Goldman's conjecture remains valid.

(i.e., $[a^{(m-1)}b^{(n-1)}.....x^{(y-1)}](p_1 + p_2) = 2(p_1)(p_2)[a^{(m-1)}b^{(n-1)}.....x^{(y-1)}]$ where $q = [a^{(m-1)}b^{(n-1)}.....x^{(y-1)}]$ is any number as a product of powers of primes.

Note that $(c\tau)$ and $(v\tau')$ are prime integers are prime numbers by construction.

Then

$$
\begin{aligned}
&2_{c\tau} = \log_{c\tau}(c\tau)^2 \neq 1_{c\tau} = \log_{c\tau}(c\tau) \\
&2_{v\tau'} = \log_{v\tau'}(v\tau')^2 \neq 1_{v\tau'} = \log_{v\tau'}(v\tau') \\
&(c\tau)^2 \neq c\tau \\
&(v\tau')^2 \neq v\tau'
\end{aligned}
$$

$c\tau, v\tau', c\tau,$ and $v\tau'$ are prime numbers, since all variables are unique and range over the set of positive real numbers.

The equation:

$$L = 2N = \left[(p_1)^2 + (p_2)^2\right] = \left[2(c\tau)(v\tau')\right]$$

Is true for all integers, since L can be uniquely expressed as a product of prime numbers by the Fundamental Theorem of Arithmetic, so that $L = 2N$ is the proof of Goldbach's conjecture (Every even number $2N$ is the sum of two primes, since if p is a prime number, so is p^n.

Note that if

$$
\begin{aligned}
&\varphi^2 = (c\tau')^2 = (c\tau)^2 + (v\tau')^2 + 2(c\tau)(v\tau') = L + 2N \\
&= (m)^2 + (n)^2 + 2(m)(n)
\end{aligned}
$$

(m) and (n) prime does not necessarily mean that (m) and (n) are prime; only if $L = 2N$ is this the case.

Application to all even numbers

The proof Goldbach's conjecture applies to all even numbers by the identification of the prime numbers with the parameterized real number (e.g. $p_1 = (c\tau)_1$ with the parameters (c_1, τ_1) running over all real numbers (and hence all prime numbers) in their respective sets $\left(|\mathbb{R}|_1, |\mathbb{R}|_2\right)$.

Connection to Physics (11/12)

The condition that $(p_1)^2 + (p_2)^2 = 2(p_1)(p_2)$ where $\varphi^2 = |M|^2 = (p_1)^2 + (p_2)^2 + 2(p_1)(p_2)$ where M is an integer and $L = 2N$ is that the number of "waves" $L = (p_1)^2 + (p_2)^2$ is equal to the number of “particles” $2(p_1)(p_2) = h^2 = 2S^2$ as prime numbers (which are unobservable, since M does not “radiate”). The prime numbers then form the (non-interacting, “orthogonal” sets)

$\{(p_1, p_2), (p_1, p_2)\} \equiv \{(p_1 \perp p_2) \perp (p_1 \perp p_2)\}$ for the case of the Binomial Expansion for $(n = 2)$. In this model, L (“waves”) can be imagined as the displacement of Maxwell’s capacitor and $2(p_1)(p_2) = h^2 = 2S^2$ as the source and sensor composed of “particles”.

However, there is nothing to prevent mortals from imagining that everything either is composed of either waves or particles …

Thus waves and particles exist independently in the imagination:

$$\psi = L + i2N$$
$$\psi(\psi^*) = (L + i2N)(L - i2N) = L^2 + (2N)^2$$

$$\psi = 2N + iL$$
$$\psi(\psi^*) = (2N + iL)(2N - iL) = (2N)^2 + (L)^2$$

but are truly countable (since independent of space-time) only by “god” (who exists (everywhere, everytime), and is always watching ME (in my imagination) .. ☺

(for “radial” coordinate “circles” - i.e., energies -, multiply everything by π) .

Conclusions and comments

(Just because I’m schizophrenic, doesn’t mean everything isn’t a figment of my imagination.)

(The Big Bang was the event that occurred just before the gleam in your father’s eye faded…)

Dark Energy is energy one cannot see (Duh!)

Caveats (there may be others)

Extension to general powers of multinomials

This proof of Goldbach’s conjecture, can be easily extended to $n > 2$ and the Multinomial Theorem by setting the resultant equal to zero and equating the individual power terms to the interaction term. This ensures that with this result, a and b are prime numbers (based on the result from the RUC), and therefore $(a+b)^n$ and $(a+b+.....)^n = (a^n + b^n + ...) = rem(a,b,...,n)$ will be composed of sums of prime numbers (as well as different powers of them (e.g.)

$$\varphi^l = \{a^n + b^m + ...\}^l = a^{nl} + b^{ml} + ...) + rem(a^{nl}, b^{ml}, n, m, l)$$

$$\varphi^{l} = \{0\}$$
$$(a^{nl} + b^{ml} + ...) = rem(a^{nl}, b^{ml}, n, m, l)$$

Implies that all the elements $\{a^{nl}, b^{ml}, ...\}$ are also prime (I believe this is Euler's corollary to Goldbach's conjecture) where $rem(a^{nl}, b^{ml}, n, m, l)$ consists of all the interaction terms of the constituent elements of the expansion.