A Novel Math: *L-Gebra* Applied to Fermat's [Extended] Last Theorem, Riemann Hypothesis & Beyond

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ABSTRACT

An introduction to L-gebra, a promising algebraic apparatus spanning areas as diverse as calculus & number theory to name but a few, and bridging the otherwise distinct if disparate operations & operators, should suffice for a potent yet succinct treatment of Fermat's [augmented] last proposition & Riemann's hypothesis.

Keywords: L-gebra, orduality, F[e]LT, RH

An IFF-Axiomatization

A detailed coverage of either the entire axiomatization or its conceptual underpinning would fall outside the intended scope. Suffice it for now to feature its *orduale* nature with the *L*-operators applying to arbitrary objects (A, B in (3) *inter alia* referring to loci on a lative psy-space with respect to its layers & branches as opposed to points, axes, states), working across operations (e.g. (3) & (6) showcasing a basic linkage between additivity vs multiplicity), and spanning categories as diverse as functions & operators (linear and otherwise), integrals & differentials, numbers & their levels-of-variableness, paths & relations, etc. Please note in passing that, whilst the upper versus lower indices exhibit remarkably 'plastic' interchange (cf. Shevenyonov (2025b-26) for similar phenomena in representing primality & higher-degree equations), those most *comparable are 'safer' to compare*: e.g. powers-with-powers (cf. Shevenyonov (2025a) for RH exponentiation issues), variables-versus-constants (2). That said, *orduality* weakens the bulk of the residuale requirements, in just how dimensionless/same-dimensionality, quotients, meromorphic functionals, quotients/rational numbers, and the like align, or feature the resultant (implied/posterior/residuale) relationship for that matter. One flipside, though, is that—in line with the rationale—the various objects can only be compared *upon* entering their *L-completion*, or generalized representation, evidently without equaling each other directly/outside. This is how (4), say, L(x) can stand for x+1 or 2^x, and L(-1) for 0 or ½.

[1] The coverage developed in its entirety as of 7-14 August 2018. With an appreciation for my jocundly elusive Muses, Ellie & Tetty—and my staunch pets, those around or late.

$$\forall x \exists L: x = L_{x-1},\ \ L_0 = L_{1-1} = 1 = L_k^0\ \ \forall k \qquad (1)$$

$$\forall \varphi, k: L_{\varphi+k} = L_\varphi + k \qquad (2)$$

$$\forall A, B: L_A L_B = L_{A+B}, \qquad L_A L_A = L_{2A} = L_A^2 \leftrightarrow L_A^n = L_{nA} \qquad (3)$$

$$L_1 = L = \begin{cases} L_0 + 1 \sim 2 \ \leftrightarrow L_x \sim \begin{cases} 2^x \\ x+1 \end{cases} \\ L_{-1} + 2 \leftrightarrow \ L_{-1} \sim \partial \sim L_1^{-1} \sim \begin{cases} 0 \\ 1/2 \end{cases} \end{cases} \qquad (4)$$

$$\varphi(x) \equiv \varphi^\circ x \sim L_{\varphi^\circ(x-1)} \ \rightarrow \varphi(x) = x^n = L_{x-1}^n = L_{(x-1)n} \qquad (5)$$

$$aL_x + bL_y = L_{a-1}L_x + L_{b-1}L_y = a + x + b + y = L_{a+b}L_{x+y-1} \qquad (6)$$

$$\exists x = \varphi \equiv \sum(\cdot), \qquad k \equiv -1: x = L_{\sum(\cdot)-1} \qquad (7)$$

Grand Applications

Fermat [Extended] LP

My long-standing early conjecture, indeed dating back as far as 1999, suggests a generalization whereby the number of the RHS terms exceeds 2 generally & is related to the power *n* either one-for-one or in more intricate ways as tentatively proposed in a set of [alternating] conjectures (C1-5). For instance, (3,4,5,6) accommodate case *T=n=3*, with *(max, mid, min)*=(6, 9/2, 3), the way *T=n=2* captures (3,4,5).

$$(z/x)^n \equiv (y/x)^n + 1 \qquad (A0)$$

$$L_{\left(\frac{z}{x}-1\right)n} = L_{\left(\frac{y}{x}-1\right)n+1} \quad \rightarrow \ \frac{z-y}{x} = 1/n \quad (A1)$$

$$z^n \equiv \sum_{i=1}^{T} x_i^n, \ \ T \geq n \qquad (C1)$$

$$L_{(z-1)n} = \sum_{i=1}^{T} L_{(x_i-1)n} \leftrightarrow (z-1)n + 1 = \sum_{i=1}^{T} [(x_i - 1)n + 1] \quad (C2)$$

$$z - \sum_{i=1}^{T} x_i = \frac{T - nT + n - 1}{n} = \frac{n-1}{n}(1 - T) \quad (C3)$$

$$T = \begin{cases} \frac{n}{n-1} * \left(\sum_{i=1}^{T} x_i - z \right) + 1 \\ \frac{n-1}{n} * \left(\sum_{i=1}^{T} x_i - z \right) \pm 1 \end{cases}^{n} \quad (C4)$$

$$\frac{x_{max} - x_{min}}{x_{mid}} = \begin{cases} (n-1)/n \\ (T-1)/n \end{cases} \quad (C5)$$

Riemann Hypothesis

As per RH, please note that the effective variable is *s*, i.e. zeta's argument. Importantly, here T denotes an 'arbitrarily large value,' which differs from its connotation in the previous section albeit pointing to things posterior & subject to discriminate structural endogenization, rarely to a value set-in-stone. The infinite sum over naturals is presumed totaling either -1/2 or commensurate of T or unknown/phi-endogenized/irrelevant (B1-4). Noteworthy, the 0~2in*pi trick was deployed in Shevenyonov (2025a) for powers only.

$$\sum_{n=1}^{T} n^{-s} \equiv \frac{1}{T} \quad (B0)$$

$$L_{\sum n[-(s-1)]} = L_{\varepsilon-1}, \qquad \sum ns = \frac{1}{2} - \varepsilon \quad (B1)$$

$$Re(s) = \frac{1}{2} \ IFF \ \left(s - \frac{1}{2}\right)^2 \equiv \varphi \in \boldsymbol{R}^- \quad (B2)$$

$$\left(s - \frac{1}{2}\right)^2 = \begin{cases} \approx s - 2 * \frac{1}{2} = s - 1 = 2\varepsilon \sim 0 \\ \left[\left(\frac{1}{2} - \varepsilon\right) \varphi\varepsilon\right]^2 \approx \left[\frac{\varphi\varepsilon}{2}\right]^2 \equiv -\hat{\varphi}, \qquad \sum n \sim \frac{1}{\varphi\varepsilon}, \qquad \varepsilon \sim 0 \sim 2n\pi i \\ (\varepsilon\varphi)^2 = -\check{\varphi}, \ \ s = \frac{1}{2} - \varepsilon\varphi \end{cases}$$

Drastic Implications

The week that followed a prior conceptual formalization, I had tried my hand on the ABC as one way around Mochizuki-style arcanity, whilst incidentally spotting parallels with objects such as the Veblen ordinals. Better yet, I do have recollections of stumbling on a *vixra* abstract published about the same time & suggesting a strikingly similar FLT result! It is unfortunate I've had difficulty locating it ever since, or getting the slightest inkling of what the derivation was about.

References

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