Natural Primes and Classical Conjectures

A reinterpretation of Goldbach, Twin Primes, and Legendre in the Natural Maths Framework

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1. Introduction

Classical number theory treats the primes as fundamental building blocks of the integers, yet begins the sequence with two historical artefacts: **1**, a unit that is not composite but is excluded from primality; and **2**, the lone even prime whose structure and behaviour contradict the rest of the spectrum.

Natural Maths, developed from the first-principles reasoning in the preceding sections ("halving zero," "natural division," and the role of 2 as the cut operator), reframes the prime numbers in a way that restores symmetry, removes the historical anomalies, and aligns the integers with physical intuition.

In this framework:

- **0** is the vacuum state.
- **2** is not a prime but the *unique symmetry operator* — the only entity nature can cut exactly.
- **1** is a relational value, not a structural entity.
- **Primes begin naturally at 3.**

Thus the **natural prime spectrum** is:

$\mathbb{P}_{\text{natural}} = \{3,5,7,11,13,17,19,23,\ldots\}$

All primes are odd.
All prime gaps are even.
No exceptions, no special cases.

Once the anomalous "even prime" is removed, the classical landscape becomes simpler, cleaner, and—most importantly—coherent with physical intuition about symmetry, curvature, and excitation states.

With this shift in the definition of primes, one can re-examine classical open problems in number theory. Surprisingly, **all the famous conjectures not only survive the transition, but become more natural**, more interpretable, and—in a few cases—stronger.

This section reinterprets:

1. **Goldbach's Conjecture**
2. **The Twin Prime Conjecture**
3. **Legendre's Conjecture**

under the Natural Maths formulation.

2. Goldbach's Conjecture in Natural Maths

2.1 Classical Formulation

Goldbach's classic statement is:

Every even integer greater than 2 can be expressed as the sum of two primes.

The constraint "greater than 2" is an early mathematical workaround for the presence of the anomalous prime (2). The smallest even number that can be expressed as a sum of *odd* primes is **6**, because:

- The smallest odd prime is 3
- $3 + 3 = 6$

This gives the natural version.

2.2 Natural Maths Reinterpretation

In the natural framework, primes begin at 3. Therefore:

Natural

Goldbach:
Natural Goldbach: Every even integer ≥ 6 is the sum of two natural primes.
This version removes the awkward historical boundary and aligns precisely with the structure of the integers.

Checking initial cases:

- $6 = 3 + 3$
- $8 = 3 + 5$
- $10 = 5 + 5$
- $12 = 5 + 7$
- $14 = 3 + 11$
- $16 = 3 + 13$

Everything proceeds cleanly, with no special cases needed.

2.3 Interpretation in Natural Maths

In Natural Maths, even numbers represent "balanced" composite energies, and primes represent discrete excitation events emerging from the curvature field. Goldbach is naturally re-expressed as:

All sufficiently low-curvature even states can be decomposed into two prime excitations.

Rather than being a numerical curiosity, Goldbach becomes a **statement about the additive structure** of excitations in the field.

3. The Twin Prime Conjecture

3.1 Classical Definition

Twin primes are pairs of primes separated by 2.

Classically, 2 is included, although awkwardly: (3,5) is technically the first genuine pair.

3.2 Natural Prime Reinterpretation

Since all natural primes are odd, the spacing between them is automatically even. The **minimum** possible prime gap is therefore 2.

Thus the conjecture becomes:

There are infinitely many minimal curvature-adjacent pairs in the natural prime spectrum.

Twin primes are simply **the lowest-energy excitation jumps** the field allows.

Examples:

- (3, 5)
- (5, 7)
- (11, 13)
- (17, 19)
- (29, 31)

Nothing breaks. In fact, the concept becomes **more physically meaningful**:

Twin primes represent symmetry-preserving adjacency in the excitation field.
They cannot vanish without violating the continuity of the underlying curvature.

3.3 Interpretation in Natural Maths

Under Natural Maths:

- Primes arise as local maxima of curvature

- Minimal-gap pairs represent **paired excitations**
- The existence of infinitely many such pairs is expected in any field with:
    - smooth decay
    - structured turbulence
    - and non-zero curvature gradient

The twin prime conjecture becomes almost unavoidable.

4. Legendre's Conjecture

4.1 Classical Form

Legendre proposed:

For every natural number n, there is always at least one prime between n^2 and $(n+1)^2$.

This is surprisingly deep: it asserts that primes cannot "thicken" or "thin out" too quickly.

4.2 In the Natural Prime Spectrum

With primes beginning cleanly at 3, the first square interval becomes:

- Between $1^2 = 1$ and $2^2 = 4$ → the prime is **3**

Following intervals:

- (4,9): 5, 7
- (9,16): 11, 13
- (16,25): 17, 19, 23

The pattern is smoother, more symmetric, and free of border cases.

4.3 Curvature Interpretation

Legendre's conjecture becomes:

The curvature field cannot remain flat over a quadratic interval.

In physical terms:

- n^2 to $(n+1)^2$ expands quadratically
- the curvature decays slowly and fractal-y

- excitation spikes (primes) appear whenever curvature crosses a threshold
- quadratic gaps are “too large” for curvature to remain spike-free

Legendre becomes a direct statement about the geometry of the underlying field.

Again:
The conjecture is more interpretable in Natural Maths than in classical arithmetic.

5. Summary and Consequences

Reframing primes through Natural Maths yields:

1. Cleaner structure

- No exceptional primes
- No parity breaks
- No historical anomalies

2. Symmetric spacing

- All prime gaps become even
- Minimal gap = 2 emerges naturally

3. Physical interpretation

- Primes as curvature spikes
- Even numbers as balanced composite states
- Square intervals as geometric growth regions
- Conjectures as statements about field behaviour

4. Conjectures strengthened

Each classical prime conjecture becomes:

- More elegant
- More geometric
- More physically interpretable
- Less dependent on historical quirks

5. Foundational consequence

Natural Maths suggests that many classical number-theory conjectures are not “arithmetical accidents,” but manifestations of **field geometry** emerging from extremely simple first principles:

- Zero is the vacuum
- Two is the cut operator
- Oddness is the natural domain of structure
- Primes are curvature excitations

This makes the theory internally coherent, physically grounded, and mathematically promising.