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\textit{of}

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Abstract

In this research monograph, the author presents a novel ‘Universal Recursive Algorithmic Scheme For Generating The Sequence Of Prime Numbers (Of 2nd Order Space [2])’.

Theory

One can note that we can represent any Asymmetric Universal Recursion Scheme [3] as

\[ \{ x \} \leftrightarrow \{ x - a \} \leftrightarrow \{ x + b \} \]

One can simply Normalize it by simply doing the operation

\[ \{ x \} \leftrightarrow \left\{ \frac{x^2 - a}{x} \right\} \leftrightarrow \left\{ \frac{x^2 + b}{x} \right\} \]

i.e.,

\[ \{ x \} \leftrightarrow \left\{ \frac{x^2 - a}{x} \right\} \leftrightarrow \left\{ \frac{x^2 + b}{x} \right\} \]

Now, we consider the first three consecutive numbers starting from 0, i.e., \{0, 1, 2\} (that are supposed to indicate some (Universal Recursion Scheme) \( 0 \leftrightarrow 1 \leftrightarrow 2 \). We now re-write all possible 6 arrangements of \( 0 \leftrightarrow 1 \leftrightarrow 2 \) namely:

<table>
<thead>
<tr>
<th>Universal Asymmetric Recursion Scheme</th>
<th>Normalized Universal Asymmetric Recursion Scheme</th>
<th>Values Of ( x, a, b )</th>
<th>Result</th>
<th>Finalized Pick From The Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>( { x } \leftrightarrow \left{ \frac{x^2 - a}{x} \right} \leftrightarrow \left{ \frac{x^2 + b}{x} \right} )</td>
<td>( { 0 } \leftrightarrow \left{ \frac{(0)^2 - (-1)}{0} \right} \leftrightarrow \left{ \frac{(0)^2 + 2}{0} \right} )</td>
<td>( x = 0, a = -1, b = )</td>
<td>Undefined</td>
<td></td>
</tr>
<tr>
<td>( 0 \leftrightarrow 1 \leftrightarrow 2 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( 1 \leftrightarrow 2 \leftrightarrow 0 )</td>
<td>( { 1 } \leftrightarrow \left{ \frac{(1)^2 - (-1)}{1} \right} \leftrightarrow \left{ \frac{(1)^2 - 1}{1} \right} )</td>
<td>( x = 1, a = -1, b = -1 )</td>
<td>1 ( \leftrightarrow 2 \leftrightarrow 0 )</td>
<td>No New Prime Number To Select</td>
</tr>
<tr>
<td>( 2 \leftrightarrow 0 \leftrightarrow 1 )</td>
<td>( { 2 } \leftrightarrow \left{ \frac{(2)^2 - (2)}{2} \right} \leftrightarrow \left{ \frac{(2)^2 - 1}{2} \right} )</td>
<td>( x = 2, a = 2, b = -1 )</td>
<td>4 ( \leftrightarrow 2 \leftrightarrow 3 )</td>
<td>Primary Number Nearest to 2</td>
</tr>
<tr>
<td>( 1 \leftrightarrow 0 \leftrightarrow 2 )</td>
<td>( { 1 } \leftrightarrow \left{ \frac{(1)^2 - (1)}{1} \right} \leftrightarrow \left{ \frac{(1)^2 + 1}{1} \right} )</td>
<td>( x = 1, a = 1, b = 1 )</td>
<td>1 ( \leftrightarrow 0 \leftrightarrow 2 )</td>
<td>No New Prime Number To Select</td>
</tr>
<tr>
<td>( 0 \leftrightarrow 2 \leftrightarrow 1 )</td>
<td>( { 0 } \leftrightarrow \left{ \frac{(0)^2 - (-2)}{0} \right} \leftrightarrow \left{ \frac{(0)^2 + 1}{0} \right} )</td>
<td>( x = 0, a = -2, b = 1 )</td>
<td>Undefined</td>
<td></td>
</tr>
</tbody>
</table>

2
Now, noting that the next nearest *Prime Number* found being 3, we now use the set \{0, 1, 2\} given in the beginning and use its two highest \{Prime\} numbers and couple the recently found 3 to form a new set \{1, 2, 3\} and consequently an *Asymmetric Universal Recursion Scheme* $1 \leftrightarrow 2 \leftrightarrow 3$. Using the same above scheme we again find a similar table for $1 \leftrightarrow 2 \leftrightarrow 3$.

<table>
<thead>
<tr>
<th>Universal Asymmetric Recursion Scheme</th>
<th>Normalized Universal Asymmetric Recursion Scheme</th>
<th>Values Of $x, a, b$</th>
<th>Result</th>
<th>Finalized Pick From The Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>${x} \leftrightarrow \left(\frac{x^2 - a}{x}\right) \leftrightarrow \left(\frac{x^2 + b}{x}\right)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$1 \leftrightarrow 2 \leftrightarrow 3$</td>
<td>${1} \leftrightarrow \left(\frac{(1)^2 - (-1)}{1}\right) \leftrightarrow \left(\frac{(1)^2 + 2}{1}\right)$</td>
<td>$x = 0, a = -1, b = 2$</td>
<td>$1 \leftrightarrow 2 \leftrightarrow 3$</td>
<td>No New Prime Number To Select</td>
</tr>
<tr>
<td>$2 \leftrightarrow 3 \leftrightarrow 1$</td>
<td>${1} \leftrightarrow \left(\frac{(2)^2 - (-1)}{2}\right) \leftrightarrow \left(\frac{(2)^2 - 1}{2}\right)$</td>
<td>$x = 1, a = -1, b = -1$</td>
<td>$2 \leftrightarrow 5 \leftrightarrow 3$</td>
<td>$\text{Prime Number Nearest to } 3$</td>
</tr>
<tr>
<td>$3 \leftrightarrow 1 \leftrightarrow 2$</td>
<td>${3} \leftrightarrow \left(\frac{(3)^2 - (2)}{3}\right) \leftrightarrow \left(\frac{(3)^2 - 1}{3}\right)$</td>
<td>$x = 2, a = 2, b = -1$</td>
<td>$9 \leftrightarrow 7 \leftrightarrow 8$</td>
<td>$\text{Prime Number greater than } 5$</td>
</tr>
<tr>
<td>$2 \leftrightarrow 1 \leftrightarrow 3$</td>
<td>${2} \leftrightarrow \left(\frac{(2)^2 - (1)}{2}\right) \leftrightarrow \left(\frac{(2)^2 + 1}{2}\right)$</td>
<td>$x = 1, a = 1, b = 1$</td>
<td>$4 \leftrightarrow 3 \leftrightarrow 5$</td>
<td>$\text{Prime Number Nearest to } 3$</td>
</tr>
<tr>
<td>$1 \leftrightarrow 3 \leftrightarrow 2$</td>
<td>${1} \leftrightarrow \left(\frac{(1)^2 - (-2)}{1}\right) \leftrightarrow \left(\frac{(1)^2 + 1}{1}\right)$</td>
<td>$x = 0, a = -2, b = 1$</td>
<td>$1 \leftrightarrow 3 \leftrightarrow 2$</td>
<td>No New Prime Number To Select</td>
</tr>
<tr>
<td>$3 \leftrightarrow 2 \leftrightarrow 1$</td>
<td>${3} \leftrightarrow \left(\frac{(3)^2 - 1}{3}\right) \leftrightarrow \left(\frac{(3)^2 - 2}{3}\right)$</td>
<td>$x = 2, a = 1, b = -2$</td>
<td>$4 \leftrightarrow 3 \leftrightarrow 1$</td>
<td>No New Prime Number To Select</td>
</tr>
</tbody>
</table>

Now, noting that the next nearest *Prime number* found being 5, we now use the set \{1, 2, 3\} given in the beginning and use its two highest \{Prime\} numbers and couple the recently found 5 to form a new set \{2, 3, 5\} and consequently a *Asymmetric Universal Recursion Scheme* $2 \leftrightarrow 3 \leftrightarrow 5$. Using the same above scheme we again find a similar table for $2 \leftrightarrow 3 \leftrightarrow 5$.

3
<table>
<thead>
<tr>
<th>Universal Asymmetric Recursion Scheme</th>
<th>Normalized Universal Asymmetric Recursion Scheme</th>
<th>Values Of $x, a, b$</th>
<th>Result</th>
<th>Finalized Pick From The Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>${x} \leftrightarrow \left{ \frac{x^2 - a}{x} \right} \leftrightarrow \left{ \frac{x^2 + b}{x} \right}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$2 \leftrightarrow 3 \leftrightarrow 5$</td>
<td>${2} \leftrightarrow \left{ \frac{(2)^2 - (-1)}{2} \right} \leftrightarrow \left{ \frac{(2)^2 + 2}{2} \right}$</td>
<td>$x = 0, a = -1, b = 3$</td>
<td>$4 \leftrightarrow 5 \leftrightarrow 7$</td>
<td>7 (Prime Number Nearest to 5)</td>
</tr>
<tr>
<td>$3 \leftrightarrow 5 \leftrightarrow 2$</td>
<td>${3} \leftrightarrow \left{ \frac{(3)^2 - (-2)}{3} \right} \leftrightarrow \left{ \frac{(3)^2 - 1}{3} \right}$</td>
<td>$x = 1, a = -2, b = -1$</td>
<td>$9 \leftrightarrow 11 \leftrightarrow 8$</td>
<td>11 (Prime Number greater than 7)</td>
</tr>
<tr>
<td>$5 \leftrightarrow 2 \leftrightarrow 3$</td>
<td>${5} \leftrightarrow \left{ \frac{(5)^2 - (3)}{5} \right} \leftrightarrow \left{ \frac{(5)^2 - 2}{5} \right}$</td>
<td>$x = 2, a = 3, b = -2$</td>
<td>$25 \leftrightarrow 22 \leftrightarrow 2$</td>
<td>23 (Prime Number greater than 7)</td>
</tr>
<tr>
<td>$3 \leftrightarrow 2 \leftrightarrow 5$</td>
<td>${3} \leftrightarrow \left{ \frac{(3)^2 - (1)}{3} \right} \leftrightarrow \left{ \frac{(3)^2 + 2}{3} \right}$</td>
<td>$x = 1, a = 1, b = 2$</td>
<td>$9 \leftrightarrow 8 \leftrightarrow 11$</td>
<td>11 (Prime Number greater than 7)</td>
</tr>
<tr>
<td>$2 \leftrightarrow 5 \leftrightarrow 3$</td>
<td>${2} \leftrightarrow \left{ \frac{(2)^2 - (-3)}{2} \right} \leftrightarrow \left{ \frac{(2)^2 + 1}{2} \right}$</td>
<td>$x = 0, a = -3, b = 1$</td>
<td>$4 \leftrightarrow 7 \leftrightarrow 5$</td>
<td>7 (Prime Number Nearest to 5)</td>
</tr>
<tr>
<td>$5 \leftrightarrow 3 \leftrightarrow 2$</td>
<td>${5} \leftrightarrow \left{ \frac{(5)^2 - 2}{5} \right} \leftrightarrow \left{ \frac{(5)^2 - 3}{5} \right}$</td>
<td>$x = 2, a = 2, b = -3$</td>
<td>$25 \leftrightarrow 23 \leftrightarrow 2$</td>
<td>23 (Prime Number greater than 7)</td>
</tr>
</tbody>
</table>

Now, noting that the next nearest Prime number found being 7, we now use the set $\{2, 3, 5\}$ given in the beginning and use its two highest $\{Prime\}$ numbers and couple the recently found 7 to form a new set $\{3, 5, 7\}$ and consequently a Asymmetric Universal Recursion Scheme $3 \leftrightarrow 5 \leftrightarrow 7$. Using the same above scheme we again find a similar table for $3 \leftrightarrow 5 \leftrightarrow 7$ and can consequently find the next Prime Number to be 11.

We can keep repeating the aforementioned scheme many, many times so on, so forth and can generate the entire ‘Sequence Of Prime Numbers’ up to a desired limit.

**Morals**

‘EkoVaasiSarvaBootaanAntaraatma’

The above Samskrutam Sloka which means ‘It Is The One That Pervades All’ is the ‘Causative Reason’ of the fact that ‘The pristineness and extent of the same of a person’s actions decide how many Souls the person dwells in’.
‘If you gaze too long at the abyss, the abyss gazes back at you’. –Frederick Nietzsche
(German Philosopher)

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\[(a+ib)^2 = (a^2 - b^2) + (2ab)i\]