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Sieve Method: Sieve the Forward and Reverse In One Time

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***Abstract*—This article carries on " Sieve Method: Sieve the Forward and Reverse In One Time" through establishing the dual element set and forms a new foundamental mathematical theory to sieve odd prime number pairs. The conclusion verifies the formula that calculating the total number of pairs that any even number is the sum of two odd prime numbers, and the minimum is that when an even number is extacted of root, the total number of odd prime number pairs is never less than one, so the Goldbach Conjecture is solved.**

***Keywords*—sieve Method; sieve the forward and reverse in one time; prime number pairs; dual element set**

I. POSITIVE AND NEGATIVE SCREENING

The only assumption is that "prime" is the only element in the mathematics of mass energy (matter and energy).

Example: take a W=26 even after prescribing the prime number of prime sieve to 2, 3, 5 (red):

Positive subsets: +S = 0 1 ② ③ 4 ⑤ 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 (positive energy of superscript)

Reverse subsets: -S = 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 ⑤ 4 ③ ② 1 0 (subscript negative energy)

(1) [theorem 1] Goldbach's conjecture for the exact solution of the formula:

$$Z_w(w) = Z_{p.q}(w) + 2Z_a(w) \cdots\cdots (1.1)$$

$$Z_{pq}(w) = w+1+\sum_{\substack{l+m\le n\\ l,m\ge 0}}(-1)^{l+m}\sum_{\substack{1\le i_1<\cdots<i_l\le n\\ 1\le j_1<\cdots<j_m\le n\\ \{i_1\cdots i_l\}\cap\{j_1\cdots j_m\}=\Phi}}\left[\frac{w-P_{i_1\cdots i_l}}{P_{j_1}\cdots P_{j_m}}+1\right]-2A_{w-1}\cdots (1.2)$$

(2) the theorem 2 any even W table as the sum of two odd primes p+q of odd prime number is at least W after prescribing an odd prime number, and a constant total of not less than 1.

$$Z'_w(w) \ge \left[\pi\left(\sqrt{w}\right)-1\right]+A_{w-1}$$

$$A_{w-1} = \begin{cases} 1 & w-1 \quad prime \quad number \quad \begin{pmatrix}1\\ w-1\end{pmatrix} Not \quad sifted \\ 0 & w-1 \quad Is \quad a \quad factor \quad \begin{pmatrix}1\\ w-1\end{pmatrix} To \quad be \quad sifted \end{cases}$$

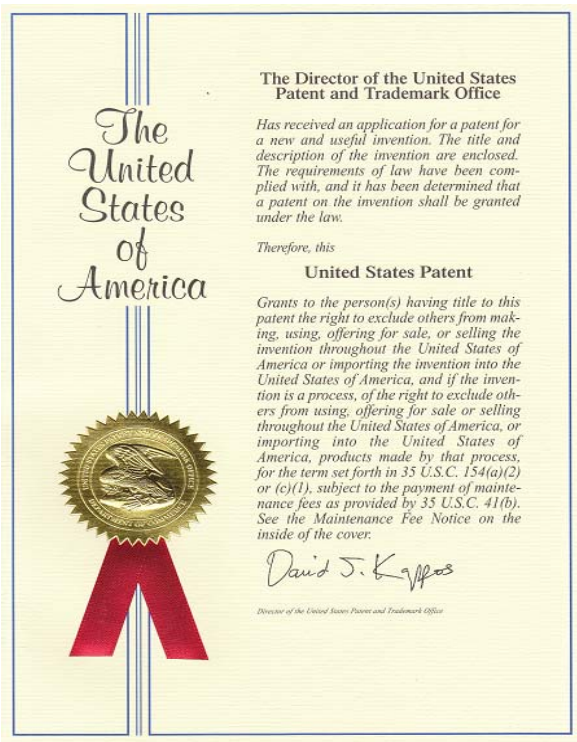
Checking calculation: Taking the minimum value =6 of the even number, the limit value.

Goldbach's conjecture

[theorem 1-2] is confirmed by the appraisal document of the United States intellectual property rights bureau and the certificate of authorization of the 2012.4.4.

After 51 years (1962-2012) and 17 Chinese University professor... Hong Kong has Qiwen professor Su Dazhu, Ph.D., Southern China Normal University clock set column number of tutors, Xiamen University mathematician Li Wenqing guiding the audit results. Opening an equation to solve two unknowns is an alternative mathematics.

If the formula (1.1) is used to calculate the "heavy prime" table, "double key lock password" "DNA sequence" "atomic energy meter"... All the "universe tables" can be accurately looked up! The realization of Ai Bernsttein "... How to establish an aesthetic system that can be strictly expressed by a formula. " A mathematical description of the lifetime of the universe!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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

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FIGURE I. US PATENT CERTIFICATE

It is easy to get w by adding to prime numbers p and q, but factoring w into p and q is difficult because it is a one-way function of uncertain solutions. It is difficult to factorize w when it is big because p and q are required to be odd prime numbers. Based on Goldbach's conjecture, the numbers of combination of (p, q) can be derived by:

$$Z_w(w) = Z_{p\text{-}q}(w) + 2Z_a(w) \qquad (1.1)$$

$$Z_{p\text{-}q}(w) = w + 1 + \sum_{\substack{l+m\le n \\ l,m\ge 0}} (-1)^{l+m} \sum_{\substack{1\le j_1<\cdots<j_l\le n \\ 1\le j_1<\cdots<j_m\le n \\ \{j_1\cdots j_l\}\cap\{j_1\cdots j_m\}=\Phi}} \left[\frac{w - r_{j_1\cdots j_m}^{j_1\cdots j_l}}{p_{j_1}\cdots p_{j_l} p_{j_1}\cdots p_{j_m}} + 1 \right] - 2A_{w-1} \qquad (1.2)$$

and here, $p_i (i = 1,2,3,\ldots,n,\ n = \pi\sqrt{w},\ \ p_1 = 2,\ \ Z_a(w)$ *is the number of the combination pairs of (p, q) in the interval of [0,* $\sqrt{w}$ *].*

$$A_{w-1} = \begin{cases} 1, \text{if } w-1 \text{ is prime number} \\ 0, \text{if } w-1 \text{ is non-prime number} \end{cases}$$

$r_{j_1\cdots j_m}^{j_1\cdots j_l}$ *is the solution of the below equation between the interval [0,w].*

$$\begin{cases} x \equiv 0 \pmod{p_{j_1} p_{j_2}\cdots p_{j_l}} \\ x \equiv w \pmod{p_{j_1} p_{j_2}\cdots p_{j_m}} \end{cases} \ldots\ldots\ldots\ldots (1.3)$$

The lower boundary of $Z_w(w)$ *is* $Z_w'(w)$*, which is defined as*

$$Z_w'(w) = \left\lfloor \pi\left(\sqrt{w}\right) - 1 \right\rfloor + A_{w-x} \qquad .(1.4)$$

7. In view of the above, it is submitted that the claims are in condition for allowance. Reconsideration and withdrawal of the rejection are requested. Allowance of claims 21-26 and 29-37 at an early date is solicited.

App. Nr.:11/881,299 Amendment B (contd) 10

8. Should the examiner believe that anything further is needed in order to place the application in condition for allowance, he is requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with proper postage as first class mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" or being facsimile transmitted to the USPTO on the date shown below.

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Name in print: Raymond Y. Chan

FIGURE II. IDENTIFICATION DOCUMENTS OF THE UNITED STATES INTELLECTUAL PROPERTY OFFICE

Take any even number, **w = 26** say.

We look at the set of its non-negative integers:

Forward Subset: **S^+ = 0, 1, 2, … , 24, 25, 26**

Backward Subset: **S^- = 26, 25, 24, … , 2, 1, 0**

S^+=	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
S^-=	**26**	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

By combining the two subsets, we can see that the sum of any arbitrary pair of numbers is equal **w = 26**.

The prime factors of the subsets **S^+** and **S^-** are:

S^+=	**x**	**1**	**2**	**3**	**x**	**5**	**x**	**7**	**x**	**x**	**x**	**11**	**x**	**13**	**x**	**x**	**x**	**17**	**x**	**19**	**x**	**x**	**x**	**23**	**x**	**x**	**x**
S^-=	**x**	**x**	**x**	**23**	**x**	**x**	**x**	**19**	**x**	**17**	**x**	**x**	**x**	**13**	**x**	**11**	**x**	**x**	**x**	**7**	**x**	**5**	**x**	**3**	**2**	**1**	**x**

√w = √26 = 5.099, which after rounding, the prime factors are **2**, **3** and **5**.

This gives us two pairs of odd primes of known elements: **3**+23 and 23+**3**, along with three pairs of odd primes with unknown elements: 7+19, 13+13 $Z_{pq}(w)$ and 19+7.

By sieving the numbers that can be divided exactly by 2, 3 and 5 in the subsets **S^+** and **S^-**, we obtain the forward and reverse collection as follows:

II. BACKGROUND

In a letter to Euler on June 7th 1742, Goldbach proposed the conjecture expressed this in two forms:

(A) Every even integer $\geq$ 6 can be written as the sum of two odd primes.

(B) Ever odd integer $\geq$ 9 can be written as the sum of three odd primes.

We call (A) the strong conjecture and (B) the weak conjecture.

III. THE THEORY

Mr. Hui uses his " Sieve Method: Sieve the Forward and Reverse In One Time" to analyze the strong form of Goldbach's Conjecture, i.e. given any even number $w > 5$, there exists two odd primes *p*, *q* such that $w = p + q$.

- Let $Z_w(w)$ be the number of pairs (p, q) that satisfies $w = p + q$ **.**

- Let

$$A_{w-1} = \begin{cases} 1, \text{ if } w-1 \text{ is prime (i.e. } (1,w-1) \text{ hasn't been sieved)} \\ 0, \text{ if } w-1 \text{ is not a prime (i.e. } (1,w-1) \text{ has been sieved)} \end{cases}$$

- Let $Z_a(w)$ be the number of pairs $(p_i, w-p_i)$ where p_i is a prime between $[0,\sqrt{w}]$ and $w-p_i$ is also prime.

- Let $Z_{pq}(w)$ be the number of pairs (p,q) that satisfies $w=p+q$ but falls outside the categories of $Z_a(w)$ and A_{w-1}.

This covers all types of number pairs we will encounter, and hence Mr. Hui proposes that:

$$Z_w(w) = Z_{pq}(w) + 2Z_a(w) \tag{1}$$

with

$$Z_{pq}(w) = w+1+\sum_{\substack{l+m\le n \\ l,m\ge 0}} (-1)^{l+m} \sum_{\substack{1\le i_1<..<i_l\le n \\ 1\le j_1<..<j_m\le n \\ \{i_1..i_l\}\cap\{j_1..j_m\}=\phi}} \left[\frac{w-r_{j_1\cdots j_m}^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}\, p_{j_1}\cdots p_{j_m}}+1\right] - 2A_{w-1} \tag{2}$$

where $r_{j_1\cdots j_m}^{i_1\cdots i_l}$ is the initial value of $S_{j_1\cdots j_m}^{i_1\cdots i_l}$, and $S_{j_1\cdots j_m}^{i_1\cdots i_l} = S^{p^{i_1}} \cap \cdots \cap S^{p^{i_l}} \cap S_{p_{j_1}} \cap \cdots \cap S_{p_{j_m}}$,

with S^{p_i} and S_{p_j} being the resultant subsets that are obtained by sieving the top and bottom rows of S by p_i and p_j respectively.

The lower bound of $Z_w(w)$, called $Z'_w(w)$, is:

$$Z'_w(w) = [\pi(\sqrt{w})-1] + A_{w-1} \tag{3}$$

where $n=\pi(\sqrt{w})$ is the number of primes between $[0,\sqrt{w}]$.

It is easy to show that $[\pi(\sqrt{w})-1]+A_{w-1}$ is always greater than or equal to 1 (as there are infinitely many primes), and thus by combining (1) and (3), Goldbach's Conjecture can be verified. The author fully understands the implication of this statement and would like to clarify that the aims behind his theories are solely for the purpose of furthering any discussion in this field. This is because the basis of his proof is fundamentally based on his concept of a 2-Way Sieve, which he believes requires a much higher level of scrutiny than it currently receives. Otherwise, he is afraid that the concept would only be deemed worthy of ridicule by the worldwide community.

IV. Proof

Here is how the proof roughly goes:

Take the set S

$$S = \left\{ \binom{0}{w}, \binom{1}{w-1}, \binom{2}{w-2}, \ldots, \binom{p_i}{w-p_i}, \ldots, \binom{x}{w-x}, \ldots, \binom{w-p_i}{p_i}, \ldots, \binom{w-2}{2}, \binom{w-1}{1}, \binom{w}{0} \right\}$$

A(0) B($\sqrt{w}$) C(w-$\sqrt{w}$) D(w)

And divide by $\sqrt{\mathbf{w}}$ into three segments: AB, BC and CD. AB and CD are symmetrical. p_i is a prime between $[0,\sqrt{w}]$ which we use to sieve the top and bottom rows of S separately.

(a) Sieve the top row of S (i.e. the Forward Sieve)

using p_i, and call the resulting subset S^{p_i} (note we will express p_i as $p_{i_1} \ldots p_{i_l}$, $l \le n$):

$$S^{p_i} = \left\{ \begin{pmatrix} 0 \\ w \end{pmatrix}, \begin{pmatrix} p_i \\ w-p_i \end{pmatrix}, \begin{pmatrix} 2p_i \\ w-2p_i \end{pmatrix} \ldots, \begin{pmatrix} x \\ w-x \end{pmatrix}, \ldots\ldots \right\} \qquad x \equiv 0 \pmod{p_i}$$

The smallest x could be is 0, which we'll denote as $r^{p_i} = 0$, the initial value of S^{p_i}. Remove S^{p_i} from S and note that $\begin{pmatrix} p_i \\ w-p_i \end{pmatrix}$ is also sieved.

(b) Take p_j and sieve the bottom row of S (the Backwards Sieve), expressing p_j as $p_{j_1} \ldots p_{j_m}$, with $m \le n$. We obtain the subset S_{p_j}:

$$S_{p_j} = \left\{ \ldots\ldots, \begin{pmatrix} w-x \\ x \end{pmatrix}, \ldots, \begin{pmatrix} w-2p_j \\ 2p_j \end{pmatrix}, \begin{pmatrix} w-p_j \\ p_j \end{pmatrix}, \begin{pmatrix} w \\ 0 \end{pmatrix} \right\} \qquad x \equiv w \pmod{p_j}$$

Since $w - x = \lambda p_j$ (with λ an integer), we get $w - x \equiv 0 \pmod{p_j}$, hence $x \equiv w \pmod{p_j}$. The minimum value of x is $r_{p_j} = \langle w \rangle_{p_j}$, $\langle w \rangle_{p_j}$ being the remainder of w divided p_j. As before this is the initial value of S_{p_j}, which we remove from S and noting again that $\begin{pmatrix} w-p_j \\ p_j \end{pmatrix}$ is also sieved.

By subtracting $S^{p_{i1}}, S^{p_{i2}}, \ldots, S^{p_{il}}, S_{p_{j1}}, S_{p_{j2}}, \ldots, S_{p_{jm}}$ from S, all elements of the form $\begin{pmatrix} \lambda p_i \\ w-\lambda p_i \end{pmatrix}$ are sieved from segments AB, BC and CD. This leaves us with pairs of odd primes $\begin{pmatrix} p \\ q \end{pmatrix}$ in the BC, which we will denote as $Z_{pq}(w)$.

Upon letting $2Z_a(w)$ be the number of pairs $\begin{pmatrix} p_i \\ w-p_i \end{pmatrix}$ between AB and CD where p_i and $w - p_i$ are both prime, we get:

$$Z_w(w) = Z_{pq}(w) + 2Z_a(w)$$

We begin by looking at the size of the sets:

$$|S| = w+1, \quad |S^{p_i}| = \left[\frac{w - r^{p_i}}{p_i} + 1 \right], \quad |S_{p_j}| = \left[\frac{w - r_{p_j}}{p_j} + 1 \right]$$

Suppose we know what $\pi(\sqrt{w})$ is. If we now consider the number of primes between BD, we obtain the following:

$$\pi(w) - \pi(\sqrt{w}) = (w+1) - 1 - \sum_{i=1}^{n} \left[\frac{w - r^{p_i}}{p_i} + 1 \right] + \sum_{0 \le I_1 < I_2 \le N}^{n} \left[\frac{w - r^{p_1 p_2}}{p_1 \cdot p_2} + 1 \right] - \mathrm{L} + (-1)^n \left[\frac{w - r^{p_1 \mathrm{L}\, p_N}}{p_1 \mathrm{L}\, p_N} + 1 \right]$$

Which simplifies to

$$\pi(w)-1=\left[\pi(\sqrt{w})-1\right]+w+\sum_{1\le l\le n}(-1)^{l}\sum_{1\le i_1<..<i_l\le n}\left[\frac{w-r^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}}\right] \qquad (2.1)$$

Now,

$$Z_{pq}(w)=\left|S-\bigcup_{\substack{i=1\\ j=1}}^{n}S_{p_j}^{p_i}\right|=\left|S\right|+\sum_{\substack{l+m\le n\\ l,m\ge 0}}^{n}(-1)^{l+m}\sum_{\substack{1\le i_1<\mathrm{L}<i_l\le n\\ 1\le j_1<\mathrm{L}<j_m\le n}}\left|S_{j_1\cdots j_m}^{i_1\cdots i_l}\right|$$

$$=\left|S\right|+\sum_{\substack{0\le i\le n\\ 0\le j\le n}}(-1)^{i+j}\sum_{\substack{1\le i_1<\mathrm{L}<i_l\le n\\ 1\le j_1<\mathrm{L}<j_m\le n}}\left|S^{p_{i_1}}\mathrm{L}\,S^{p_{i_l}}S_{p_{j_1}}\mathrm{L}\,S_{p_{j_m}}\right|$$

$$=\left|S\right|+\sum_{\substack{0\le i\le n\\ 0\le j\le n}}\left|S_{p_j}^{p_i}\right|+\sum_{\substack{0\le i_1<i_2\le n\\ 0\le j_1<j_2\le n}}\left|S^{p_{i_1}}S_{p_{j_2}}\right|-\sum_{\substack{0\le i_1<i_2<i_3\le n\\ 0\le j_1<j_2<j_3\le n}}\left|S^{p_{i_1}}S_{p_{j_2}}^{p_{i_2}}S_{p_{j_3}}\right|+\mathrm{L}\ +(-1)^{l+m}\left|S^{p_{i_1}}\square S_{p_{j_m}}\right|$$

$$=w+1-\sum_{\substack{0\le i\le n\\ 0\le j\le n}}\left[\frac{w-r_j^{i}}{p_{i,j}}+1\right]+\sum_{\substack{0\le i_1<i_2\le n\\ 0\le j_1<j_2\le n\\ \{i_1i_2\}\mathrm{I}\{j_1j_2\}}}\left[\frac{w-r_{j_1j_2}^{i_1i_2}}{p_ip_j}+1\right]-\sum_{\substack{0\le i_1<i_2<i3\le n\\ 0\le j_1<j_2<j3\le n\\ \{i_1\mathrm{L}i_3\}\mathrm{I}\{j_1\mathrm{L}j_3\}}}\left[\frac{w-r_{j_1\square j_3}^{i_1\square i_3}}{p_i\square p_j}+1\right]$$

$$+\mathrm{L}+(-1)^{l+m}\left[\frac{w-r_{j_1\mathrm{L}j_m}^{i_1\mathrm{L}i_l}}{p_i\mathrm{L}p_j}+1\right]-2A_{w-1}$$

$$=w+1+\sum_{\substack{l+m\le n\\ l,m\ge 0}}(-1)^{l+m}\sum_{\substack{1\le i_1<..<i_l\le n\\ 1\le j_1<..<j_m\le n\\ \{i_1..i_l\}\mathrm{I}\{j_1..j_m\}=\phi}}\left[\frac{w-r_{j_1\cdots j_m}^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}\,p_{j_1}\cdots p_{j_m}}\right]-2A_{w-1}$$

Where

$$r_{j_1\cdots j_m}^{i_1\cdots i_l}=\begin{cases}x\equiv 0 \pmod{p_{i_1}}\\ x\equiv 0 \pmod{p_{i_2}}\\ \cdots\cdots\cdots\cdots\\ x\equiv 0 \pmod{p_{i_l}}\\ x\equiv w \pmod{p_{j_1}}\\ x\equiv w \pmod{p_{j_2}}\\ \cdots\cdots\cdots\cdots\\ x\equiv w \pmod{p_{j_m}}\end{cases}=\begin{cases}x\equiv 0 \pmod{p_{i_1}\cdots p_{i_l}}\\ x\equiv w \pmod{p_{j_1}\cdots p_{j_m}}\end{cases}$$

Moving on, we now show

$$Z'_w(w)=[\pi(\sqrt{w})-1]+A_{w-1} \qquad (3)$$

Prior to sieving, we can alter (2.1) slightly to express the sum of odd prime pairs $Z_w(w)$ and pairs that contain a single odd prime $Z_p(w)$ as:

$$2Z_w(w)+Z_p(w)=2\left\{\left[\pi(\sqrt{w})-1\right]+w+\sum_{1\le l\le n}(-1)^l\sum_{1\le i_1<..<i_l\le n}\left[\frac{w-r^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}}+1\right]\right\} \quad \textbf{(2.2)}$$

After applying the 2-Way Sieve, segments AB and BD are removed, leaving us with $Z_{pq}(w)$ in segment BC, i.e.

$$2Z_w(w)+2Z_a(w)=2\left\{\left[\pi(\sqrt{w})-1\right]+w+\sum_{1\le l\le n}(-1)^l\sum_{1\le i_1<..<i_l\le n}\left[\frac{w-r^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}}+1\right]\right\}-Z_p(w)-2\left[\pi(\sqrt{w})-1\right]-2A_{w-1}$$

And substituting in equation (1), we get:

$$2Z_{pq}(w)+Z_p(w)=2\left\{w+\sum_{1\le l\le n}(-1)^l\sum_{1\le i_1<..<i_l\le n}\left[\frac{w-r^{i_1\cdots i_l}}{p_{i_1}\cdots p_{i_l}}+1\right]\right\}-2A_{w-1} \quad (2.3)$$

So equations (2.2) and (2.3) must be satisfied before and after sieving. Thus we can solve these simultaneously to get:

$$2Z_w(w)-2Z_{pq}(w)=2[\pi(\sqrt{w})-1]+2A_{w-1}$$

$$Z_w(w)=[\pi(\sqrt{w})-1]+A_{w-1}+Z_{pq}(w)$$

Now suppose that $Z_{pq}(w)=0$, then we are left with the minimum value of $Z_w(w)$, which is:

$$Z'_w(w)=[\pi(\sqrt{w})-1]+A_{w-1} \quad (3)$$

V. Some Brief Examples

1) Take $w = 10$.

$w - 1 = 10 - 1 = 9$ is not prime, so $A_{w-1} = 0$.

$$n=\pi(\sqrt{10})=2,\quad p_{i_1}=p_{j_1}=2,\quad p_{i_l}=3,\quad p_{j_m}=3'$$

$$Z_{pq}(w)=10+1-\left\{\left[\frac{10-0}{2}+1\right]+\left[\frac{10-1}{3}+1\right]+\left[\frac{10-1}{3'}+1\right]\right\}+\left\{\left[\frac{10-4}{3.2}+1\right]+\left[\frac{10-4}{2.3'}+1\right]\right\}-0$$

$$=11-(6+4+4)+(2+2)=11-14+4=1$$

and $2Z_a(w)=2$ (since we have 7+3 and 3+7).

$\therefore Z_w(w)=Z_{pq}(w)+2Z_a(w)=1+2=3$ (the three pairs being 3+7, 5+5 and 7+3).

$$Z'_w(w)=[\pi(\sqrt{w})-1]+A_{w-1}=2-1+0=1$$

is also correct.

2) Take $w = 12$

$w - 1 = 12 - 1 = 11$ is prime, so $A_{w-1} = 1$.

$$n=2\quad p_{i_l}=2,3\quad p_{j_m}=2',3'\quad r^{2.3}=r_{2'.3'}=\langle 12\rangle_{2'.3'}=0$$

and $Z_a(w)=0$.

$$Z_{pq}(w) = 12 + 1 - \left\{ \left[\frac{12}{2} + 1 \right] + \left[\frac{12}{3} + 1 \right] \right\} + \left[\frac{12}{2.3} + 1 \right] - 2$$

$$= 13 - (7 + 5) + 3 - 2 = 2$$

$$\therefore Z_w(w) = Z_{pq}(w) + 2Z_a(w) = 2 + 0 = 2$$

(the two pairs being 5+7 and 7+5)

$Z'_w(w) = [\pi(\sqrt{w}) - 1] + A_{w-1} = 2 - 1 + 1 = 2$ is also correct.

Calculation：

$$Z'_w(w) = \left[\pi\left(\sqrt{w}\right) - 1\right] + A_{W+1} \qquad (1.4)$$

REFERENCES

[1] 2001-2004, the vice professor Song Fugao of Shen Zhen university calculated $w=6 \rightarrow 10^7$ comformed with (1.4)

[2] 2002,professor Zhu Lie of Su Zhou university calculated $w < 20001$ comformed with (1.4)

[3] 2006,professor Xu Zuoming of Liao Ning university calculated $w = 6 \rightarrow 10^{11}$ comformed with (1.4)