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Commentary

Comment: Paper on the progress of pure mathematics "proof of 3x + 1 conjecture"

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Abstract

The unresolved problem in number theory: the 3x+1 problem, deeply loved by math enthusiasts. I saw a paper titled "Proof of 3x+1 Conjecture" in the Journal of Pure Mathematical Progress (ISSN Print: 2160-0368), and its proof was incorrect.

Introduction

The 3x+1 problem [1,2] is one of the unsolved problems in number theory.

A lot of people have been attracted to solving the problem.

Paper in the Journal of Pure Progress in Mathematics on "Proof of the 3X+1 Conjecture" [3], the proof of it [3] is incorrect.

There are two errors, the first is a correctable error and another is a fatal mistake.

Detailed comments

Modifiable errors

Extraction part (i): See the top section on page 15 [3].

Proposition 1 : $4^r \in C_4 (r \in Z^+)$, and its row number $n = 4^{r-1} - \frac{4^{r-1}-1}{3}$.

Proof : $\because 4^r - 4 = 4(4^{r-1} - 1) = 4[(2^{r-1})^2 - 1] = 4(2^{r-1}+1)\ (2^{r-1}-1)$

$3 \mid \left(2^{r-1}+1\right) \cdot 2^{r-1} \cdot \left(2^{r-1}-1\right)$, but $3 \mid 2^{r-1}$.

$\therefore 3 | \left(2^{r-1}-1\right)\left(2^{r-1}+1\right)$.

$\therefore 6 | 4\left(2^{r-1}-1\right)\left(2^{r-1}+1\right)$.

Let $4^r - 4 = 6(n-1)\ (n \in Z^+)$.

$\therefore 4^r = 6(n-1)+4$.

$\therefore 4^r \in C_4$. (i)

$\because r \in Z^+$

$\therefore \{3 \mid \left(2^{r-1}+1\right) \times \left(2^{r-1}\right) \times \left(2^{r-1}-1\right)\}$ Inaccurate

$\because r = 1 \in \{r \in Z^+\}$

$\Rightarrow \left(2^{1-1}+1\right) \times \left(2^{1-1}\right) \times \left(2^{1-1}-1\right) \neq$ An integral multiple of 3

Only : $1 < r \in Z^+$

$\Rightarrow \{3 | \left(2^{r-1}+1\right) \times \left(2^{r-1}\right) \times \left(2^{r-1}-1\right)$

Correction method: setting $1<r\in Z^+$

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Non-modifiable fatal errors

Extraction part (ii): See the lower end of page 11 and the upper end of page 12.

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 7 & 8 & 9 & 10 & 11 & 12 \\ \dots & \dots & \dots & \dots & \dots & \dots \\ 6n-5 & 6n-4 & 6n-3 & 6n-2 & 6n-1 & 6n \\ \dots & \dots & \dots & \dots & \dots & \dots \end{pmatrix} \Rightarrow \begin{pmatrix} 4 \\ 10 \\ \dots \\ 6n-2 \\ \dots \end{pmatrix} \quad \text{(ii)}$$

The fourth column in Figure (ii): 6n-2

{4,10,16,22,28,34,40,46,52,58,64,...,(6n1-2),...}∈(6n-2) (1)

The first line, n=1, (6n-2)=4

The second line, n=2, (6n-2)=10

The third line, n=3, (6n-2)=16

....

The author takes n as the serial number of each line.

The original author added: (6n-2) = 6(n-1)+4, This is correct

Author's formula: $4^r = 6(n-1)+4$, There will be mistakes.

Extraction part (iii): See the top section on page 15.

$\therefore 4^r = 6(n-1)+4$

$\therefore 4^r \in C_4$

The following mathematical induction proves that row number of 4^r is $4^{r-1} - \frac{4^{r-1}-1}{3} (r \in Z^+)$.

Proof: 1) As $r=1$, $n = 4^{1-1} - \frac{4^{1-1}-1}{3} = 1$, the conclusion is correct.

2) It is assumed that the conclusion is correct as $r=s(s\in Z^+, s\geq 1)$, that is

$$4^s = 6(4^{s-1} - \frac{4^{s-1}-1}{3} - 1) + 4 \cdot \quad \text{(iii)}$$

Let's look at n=2. The second line gets: $4^r=6(n-1)+4=10$

$\Rightarrow 4^r = 10 \Rightarrow r \notin Z^+$

Conflict with $r\in Z^+$. See: (i).

Let's look at n=3. The second line gets: $4^r = 6(n-1)+4 = 16$

$\Rightarrow 4^r = 16 \Rightarrow 2 = r\in Z^+$

Let's look at n=4. The second line gets: $4^r=6(n-1)+4=22$

$\Rightarrow 4^r = 22 \Rightarrow r \notin Z^+$

Conflict with $r\notin Z^+$.See: (i).

The truth is:

From formula (1):

$\{4,10,16,22,28,34,40,46,52.58,64,\dots,(6n_1-2),\dots\}\in(6n-2)$

$\{4,10,16,22,28,34,40,46,52.58,64,\dots,(6n_1-2),\dots\}\in(6n-2) \notin 4^r$.

$(6n-2)=6(n-1)+4 \nRightarrow \{4,16,64,\dots 4^n,\dots\} \in 4^r$

Many numbers are missing: {10,22,28,34,40,46,52,58,...}

$\{10,22,28,34,40,46,52,58,\dots\} \notin 4^r$.

$\therefore 4^r \neq 6(n-1)+4=6n-2$

$\therefore 4^r \notin C_4$

When the author [1] chooses n as the serial number and $(1<r\in Z^+)$ cannot obtain:

$6(n-1)+4=4^r\in C_4$

Get: The author did not prove (3X+1).

Conclusion

If in [3] the author corrects the second error, then [3] the author's method cannot prove (3X+1).

References

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