PRIME NUMBERS THEORY

Grzegorz Hoppe

LET:

$$Q = N\backslash\left[\bigcup_{n\in N} 2n\right]\backslash\left[\bigcup_{n\in N} 3n\right]\backslash\left[\bigcup_{n\in N} 5n\right]\backslash\left[\bigcup_{n\in N} 7n\right]$$

BASED ON THE BASIC THEOREM OF ARITHMETIC:

$$\forall a \in N: \quad a = 2^n * 3^m * 5^s * 7^t * q$$

$$n, m, s, t \in N_{\{0\}};\ q \in Q;$$

THEN:

$$N = \left[\bigcup_{n\in N\{0\}} 2^n\right] \times \left[\bigcup_{m\in N\{0\}} 3^m\right] \times \left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right]$$

AND:

$$N = \left[\bigcup_{n\in N\{0\}} 2^n\right] \times \left[\bigcup_{m\in N\{0\}} 3^m\right] \times \left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[N\backslash\left[\bigcup_{n\in N} 2n\right]\backslash\left[\bigcup_{n\in N} 3n\right]\backslash\left[\bigcup_{n\in N} 5n\right]\backslash\left[\bigcup_{n\in N} 7n\right]\right]$$

AND THEH:

$$N = \left[\bigcup_{n\in N} 2^n\right] \times \left[\bigcup_{m\in N\{0\}} 3^m\right] \times \left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] \cup$$

$$\cup \left[\bigcup_{m\in N} 3^m\right] \times \left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] \cup$$

$$\cup \left[\bigcup_{s\in N} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] \cup$$

$$\cup \left[\bigcup_{t\in N} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] \cup$$

$$\cup \left[\bigcup_{q\in Q} q\right]$$

CAUSE:

$$\left[\{1,2\} \cup \left[\bigcup_{n\in N} 6n\right] \cup \left[\bigcup_{n\in N}(6n \pm 3)\right] \cup \left[\bigcup_{n\in N}(6n \pm 2)\right]\right] \supset \left[\bigcup_{n\in N\{0\}} 2^n\right] \times \left[\bigcup_{m\in N\{0\}} 3^m\right] \cap \left[\bigcup_{n\in N}(6n \pm 1)\right] = \emptyset$$

THEN:

$$\left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] = \left[\bigcup_{n\in N\{0\}} (6n \pm 1)\right]$$

LET:

$$P_{1;11} = [P \cup \{1\}]\backslash\{2,3,5,7\}$$

THEN:

$$Q = \left[\{1\} \cup \left[\bigcup_{q\in Q} q\right]\right] = \left[\{1\} \cup \left[\bigcup_{a\in N;\ \ b\in P_{1;11}} b(6a \pm 1)\right]\right]$$

AND:

$$\left[\bigcup_{s\in N\{0\}} 5^s\right] \times \left[\bigcup_{t\in N\{0\}} 7^t\right] \times \left[\bigcup_{q\in Q} q\right] = \left[\bigcup_{n\in N\{0\};b\in\{5,7\}} b(6n \pm 1)\right]$$

AND THEN:

for b = 1

$$P \subset \left[\{2,3,5,7\} \cup \left[\bigcup_{a>1\ \in N} (6a \pm 1)\right]\right]$$

elimination of the numbers (6a ± 1) in the second and next powers

CAUSE:

∀a € N

$$(6a+1)*(6a+1)=6a(6a+2)+1$$

$$(6a-1)*(6a-1)=6a(6a-2)+1$$

$$(6a-1)*(6a+1)=6a^2-1$$

THEN:

$$(6a+1)\neq(6n(6n+2)+1)\rightarrow a\neq n(6n+2)\rightarrow if\ a\neq 6n+2;\ n\in N$$

$$(6a-1)\neq(6n(6n-2)+1)\rightarrow 6a\neq 6n(6n-2)+2\rightarrow if\ a\in N$$

$$(6a-1)\neq 6a^2-1\rightarrow 6a\neq 6a^2\rightarrow if\ a\neq a^2\rightarrow if\ a\neq 1$$

elimination of the numbers divisible by 5 or 7 from all other numbers in form (6a ± 1)

CAUSE:

∀ n, m € N

$$(6n\pm 1)\neq 5(6m\ \pm 1)\rightarrow 6n\neq 30m\pm 5\pm 1$$

$$(30m\pm 5\pm 1)\neq 6n\rightarrow n\neq 5m\pm(5\pm 1)*\frac{1}{6}$$

THEN:

$$\rightarrow[n\neq(5m+1);\ for\ numbers\ (6n-1)]$$

$$\rightarrow[and\ n\neq(5m-1);\ for\ numbers\ (6n+1)]$$

CAUSE:

∀ n, m € N

$$(6n\pm 1)\neq 7(6m\ \pm 1)\rightarrow 6n\neq 42m\pm 7\pm 1$$

$$(42m\pm 7\pm 1)\neq 6n\rightarrow n\neq 7m\pm(7\pm 1)*\frac{1}{6}$$

THEN:

$$\rightarrow[n\neq(7m+1);\ for\ \ numbers\ (6n+1)]$$

$$\rightarrow[and\ n\neq(7m-1);\ for\ numbers\ (6n-1)]$$

THEN:

$$P = \{2, 3, 5, 7\} \cup$$

$$\cup \{p | p = (2^{n+1} * 3^{m+1} * q - 1); n, m \in N; q \in Q\} \backslash \{35\}$$

$$\cup \{p | p = (2 * 3^{n+1} * q - 1); n \in N; q \in Q\} \backslash \{35\}$$

$$\cup \{p | p = (3 * 2^{n+1} * q - 1); n \in N; q \in Q\} \backslash \{35\}$$

$$\cup \{p | p = (2^{n+1} * 3^{m+1} * q + 1); n, m \in N; q \in Q\}$$

$$\cup \{p | p = (3 * 2^{2n+2} * q + 1); n \in N; q \in Q\}$$

$$\cup \{p | p = (12 * q + 1); q \in Q\}$$

$$\cup \{p | p = (30 * q + 1); q \in [Q \backslash P]\}$$

$$\cup \{p | p = (42 * q + 1); q \in [Q \backslash P]\}$$

AND THEN:

$$\textit{Set of Prime Numbers } P:$$

$$\textit{is a sum of sets: } \{2, 3, 5, 7\} \textit{ and set of all } p | p = (6a \pm 1);$$

$$\textit{such that}:$$

$$p = (6a - 1);$$

$$\forall a \neq 6; a \in \{\{5, 7\} \cup [6N \backslash 5N \backslash 7N] \cup [3N \backslash 4N \backslash 5N \backslash 7N] \cup [2N \backslash 5N \backslash 7N \backslash 9N]\}$$

$$p = (6a + 1);$$

$$\forall a \in \{[6N \backslash 5N \backslash 7N] \cup [12N \backslash 5N \backslash 7N \backslash 9N \backslash 24N]\}$$

$$p = (6 * 2q + 1); \quad \forall q \in Q;$$

$$p = (6 * 5q + 1); \quad \forall q \in [Q \backslash P]$$

$$p = (6 * 7q + 1); \quad \forall q \in [Q \backslash P]$$

Where:

$$Q = N \backslash \left[\bigcup_{n \in N} 2n\right] \backslash \left[\bigcup_{n \in N} 3n\right] \backslash \left[\bigcup_{n \in N} 5n\right] \backslash \left[\bigcup_{n \in N} 7n\right]$$