Notation:

$\oplus$: bitwise XOR, i.e. performs a bitwise XOR on the binary digits of two numbers x and y and then converts the resulting binary number back to decimal

ZB(n) : the number of 0's in the binary representation of n

(n,m) : GCD(n,m)

Definition

Consider the set of functions $F=\{f_k\}$, where for every k =1..5,

$f_k : \mathbf{N} - \{1,2\} \rightarrow \mathbf{N}$,

having the following properties:

A1. $f_1(n) = n^3$

A2. $f_2(n) = \tilde{n}$,

where

$\tilde{n} = \min\{m : m \in \mathbf{N}, m \geq ((n^3 \oplus n^2) + ZB(n^3 \oplus n^2))$ and $(m, f_1(n)) = 1\}$

A3. $f_3(n) = p$, where $0 < p < f_1(n)$ and p is the solution of the equation

$x\, f_2(n) \equiv 1 \pmod{f_1(n)}$

A4. $f_4(n) = f_1(n) - f_3(n)$

A5. $f_5(n) = f_1(n) \oplus f_4(n)$,

and the equation

$$f_5(n) = \alpha_0,$$

where α_0 is a given value.