1a

$N = 2$

$6 \mid 2^3 - 2 = 6$

$N = 3$

$6 \mid 3^3 - 3 = 24$

$N = k$

$6 \mid (k^3 - k)$

$K^3 - k = 6x$

$6x = ((k+1)^3 - (k+1))$

$6x = (k^3+3k^2+3k+1 - (k+1))$

$6x = k^3 + 3k^2 + 3k + 1 - k - 1$

$6x = k^3 + 3k^2 + 2k$

$6x = (k^3 - k) + 3k(k + 1)$

k or k+1 must be even

1b

$N = 1$

$3*1 - 1 = 2 = 1(3*1+1)/2 = 2$

$N = 2$

$3*2 - 1 + 2 = 7 = 2(3*2+1)/2 = 7$

$N = k$

$2 + 5 + 8... + (3k-1) = k(3*k+1)/2$

$\Sigma\ 3k-1 = k(3*k+1)/2$

2

$A_n = 4a_{a-1} - 4a_{a-2}$ $a_n = 2^n(n - 2)$

$A_3 = 4a_2 - 4a_1$ $a_3 = 2^3(3 - 2)$

$A_3 = 4*0 - 4*-2$ $a_3 = 2^3(1)$

$A_3 = 8$ $a_3 = 8$

$A_{k+1} = 2^{k+1}(K+1 - 2)$

$A_{k+1} = 2 * 2^k * (k+1 - 2)$

$A_{k+1} = 2(k+1 - 2) * 2^k$

$A_{k+1} = 2^k(2k-2)$

3

I   Gcd(a, a^2) = a

Ii   1

Iii   if a is even: 2

        If a id odd: 1