OMK 2014 – Sulong (3 July 2015)

B2 By means of expansion, our generating function also yields

$$f(w^3) = f(1)$$

So, $f(w^3) = A_0 + A_1 + A_2$ ~ 7

Also, $f(w) = A_0 + A_1 w + A_2 w^2$ ~ 8

and $f(w^2) = A_0 + A_1 w^2 + A_2 w^4$

$$= A_0 + A_1 w^2 + A_2 \times w^3 \times w$$

i.e. $f(w^2) = A_0 + A_1 w^2 + A_2 w$ ~ 9

Equating, 4 & 7, 5 & 8 and 6 & 9, we obtain:

$$2^{2011} = A_0 + A_1 + A_2 \quad \sim 10$$

$$-2^{670} w^2 = A_0 + A_1 w + A_2 w^2 \quad \sim 11$$

$$-2^{670} w = A_0 + A_1 w^2 + A_2 w \quad \sim 12$$

Adding, 10 + 11 + 12:

$$2^{2011} - 2^{670} w^2 - 2^{670} w = 3A_0 + A_1 (1 + w + w^2) + A_2 (1 + w + w^2)$$

$$2^{2011} - 2^{670} (w + w^2) = 3A_0 + A_1 (1 + w + w^2) + A_2 (1 + w + w^2)$$

$$2^{2011} - 2^{670} (-1) = 3A_0 + A_1 (0) + A_2 (0)$$

using 3c

using 3

So, $2^{2011} + 2^{670} = 3A_0$ → or $A_0 = \dfrac{2^{2011} + 2^{670}}{3}$ ~ 13