>

a_n = a_{n-1} +8a_{n-2} -12a_{n-3} +25(-3)^{n-2} + 32n^2 -64

> *restart*;

> $rec := a(n) = a(n-1) + 8\cdot a(n-2) - 12\cdot a(n-3) + 25\cdot(-3)^{n-2} + 32\cdot n^2 - 64;$

$$rec := a(n) = a(n-1) + 8\,a(n-2) - 12\,a(n-3) + 25\,(-3)^{n-2} + 32\,n^2 - 64 \tag{1}$$

> $ICs := a(0) = 130, a(1) = 215, a(2) = 260;$

$$ICs := a(0) = 130, a(1) = 215, a(2) = 260 \tag{2}$$

The solution to the recursion is a(k) = ak below:

> $ak := rsolve(\{rec, ICs\}, a(k));$

$$ak := \left(-\frac{61}{2}\,k - \frac{61}{2}\right) 2^k - \frac{178}{25}\,(-3)^k - \frac{1952}{25}\,2^k + \left(\frac{497}{10}\,k + \frac{497}{10}\right) 2^k + (k+1)\,(-3)^k + 16\,(k+1)\left(\frac{1}{2}\,k + 1\right) + 52\,k + 179 \tag{3}$$

> $rsolve(\{rec, ICs\}, a, 'genfunc'(z)):$

> $expand(\%):$

> $Az := convert(\%, parfrac, z);$

$$Az := \frac{1952}{25\,(-1+2\,z)} - \frac{16}{(-1+z)^3} + \frac{1}{(1+3\,z)^2} + \frac{96}{5\,(-1+2\,z)^2} - \frac{178}{25\,(1+3\,z)} + \frac{52}{(-1+z)^2} - \frac{127}{-1+z} \tag{4}$$

> $series(Az, z=0, 6);$

$$130 + 215\,z + 260\,z^2 + 569\,z^3 + 742\,z^4 + 2235\,z^5 + O(z^6) \tag{5}$$

A(z) = Az is the generating function of the sequence a(k).

>