

$$\begin{cases} a_0 = 10 \\ a_1 = 6 \\ a_n = 5.a_{n-1} - 4.a_{n-2} + 3^n \end{cases} *$$

i) Implementar una función en Haskell llamada "irene" que devuelva los terminos de a_n

irene:: Integer ---> Integer

irene n = 5. irene_(n-1) - 4 irene_(n-2) + 3ⁿ

irene 0 = 10

irene 1 = 6

ii) Resolver la ecuación *

Resolución: $x^2 - 5x + 4 = 0 \rightarrow x = 4$ $\rightarrow a_n = C_1 \cdot 1^n + C_2 \cdot 4^n$ Solución de la ecuación homogénea.
 $\rightarrow x = 1$

Siguiente paso:

Para que $k \cdot 3^n$ sea una solución particular de * sustituimos $a_n = k \cdot 3^n$ en *

$$k \cdot 3^n = 5k \cdot 3^{n-1} - 4k \cdot 3^{n-2} + 3^n$$

Simplificamos entre 3^{n-2} , dividimos a todos los terminos entre 3^{n-2}

$$k \cdot 3^n = 5k \cdot 3 - 4k + 3^2$$

$$9k = 15k - 4k + 9$$

$$9k - 11k = 9$$

$$-2k = 9$$

$$k = -\frac{9}{2}$$

Repaso:

$$\frac{3^n}{3^{n-2}} = 3^2$$

$$\frac{3^n}{3^{n-1}} = 3^1$$

$$\frac{3^{n-1}}{3^{n-2}} = 3$$

Tercer paso: Halla C1 y C2

$$a_n = C1 \cdot 1^n + C2 \cdot 4^n - \frac{9}{2} \cdot 3^n$$

$$a_0 = C1 + C2 \cdot 4^0 - \frac{9}{2} \cdot 3^0 = 10$$

$$a_1 = C1 + C2 \cdot 4^1 - \frac{9}{2} \cdot 3^1 = 6$$

$$\left\{ \begin{array}{l} C1 + C2 - \frac{9}{2} = 10 \xrightarrow{-1} -C1 - C2 + \frac{9}{2} = -10 \\ C1 + 4C2 - \frac{27}{2} = 6 \end{array} \right.$$

$$C1 + 4C2 - \frac{27}{2} = 6$$

$$\rightarrow 3C2 - 9 = -4$$

$$3C2 = 9 - 4$$

$$C2 = \frac{5}{3}$$

$$C1 + C2 - \frac{9}{2} = 10$$

$$C1 + \frac{5}{3} - \frac{9}{2} = 10$$

$$C1 = \frac{10}{1} - \frac{5}{3} + \frac{9}{2}$$

$$C1 = \frac{60}{6} - \frac{10}{6} + \frac{27}{6} = C1 = \frac{77}{6}$$

$$a^n = \frac{77}{6} + \frac{5}{3} \cdot 4^n - \frac{9}{2} \cdot 3^n$$

Verificación:

$$a_0 = \frac{77}{6} + \frac{5}{3} - \frac{9}{2}$$

$$a_0 = \frac{77 + 10 - 27}{6} = \frac{60}{6} = 10$$

$$a_1 = \frac{77}{6} + \frac{5}{3} \cdot 4^1 - \frac{9}{2} \cdot 3^1$$

$$a_1 = \frac{77}{6} + \frac{20}{3} - \frac{27}{2}$$

$$a_1 = \frac{77 + 40 - 81}{6} = \frac{36}{6} = 6$$

$$a_2 = \frac{77}{6} + \frac{5}{3} \cdot 4^2 - \frac{9}{2} \cdot 3^2$$

$$a_2 = \frac{77}{6} + \frac{80}{3} - \frac{81}{2}$$

$$a_2 = \frac{77 + 160 - 243}{6} = \frac{-6}{6} = -1$$

n=2

$$a_2 = 5 \cdot a_1 - 4 \cdot a_0 + 3^2$$

$$a_2 = 5 \cdot 6 - 4 \cdot 10 + 9$$

$$a_2 = 30 - 40 + 9$$

$$a_2 = -1$$