> # Okey first we need to rewrite the given recursive expression as a matrix multiplication

> # Waarbij de midden matrix (A):
> restart:

> with(LinearAlgebra):

> $A := Matrix([[3, 4], [1, 0]])$

$$A := \begin{bmatrix} 3 & 4 \\ 1 & 0 \end{bmatrix} \tag{1}$$

> # We need our eigenvalues and vectors, because we want to study the behaviour in infinity

> # Think of $u\_k = A^k \cdot u_{k-1} = \ldots A^k \cdot u_0$

> $J, Q := JordanForm(A, output = ['J', 'Q'])$

$$J, Q := \begin{bmatrix} -1 & 0 \\ 0 & 4 \end{bmatrix}, \begin{bmatrix} \frac{1}{5} & \frac{4}{5} \\ -\frac{1}{5} & \frac{1}{5} \end{bmatrix} \tag{2}$$

> # Since maple sucks, we cannot do matrix matrix with an abstract k... So do it this way

> # Define J^k manually
> k := 'k'; # keep k as a symbolic variable
> Jk := Matrix([[(-1)^k, 0], [0, 4^k]]);

$$k := k$$

$$Jk := \begin{bmatrix} (-1)^k & 0 \\ 0 & 4^k \end{bmatrix} \tag{3}$$

> # Define the inverse of Q
> Qinv := MatrixInverse(Q);
>
> # Define the vector
> v := Vector([1, 1]);
>
> # Compute the expression: Q * J^k * Q^(-1) * v
> result := (Q . Jk . Qinv) . v;

$$Qinv := \begin{bmatrix} 1 & -4 \\ 1 & 1 \end{bmatrix}$$

$$v := \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

(4)

$$result := \begin{bmatrix} -\frac{3\,(-1)^k}{5} + \frac{8\,4^k}{5} \\ \frac{3\,(-1)^k}{5} + \frac{2\,4^k}{5} \end{bmatrix} \quad (4)$$

> *# Take the limit of this equation*

> $limit\left(\frac{result[1]}{result[2]}, k = \mathrm{infinity}\right)$

$$4 \quad (5)$$

> *# Hupa, answered!!!*

>