Computing A to the k

A = $\begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$

Find A^{147}

Rewrite $A = BDB^{-1}$

$A^{147} = (BDB^{-1})^{147} = BD^{147}B^{-1} = B \begin{bmatrix} -2 & 0 \\ 0 & 5 \end{bmatrix}^{147} B^{-1}$

Example

$A_{EE} = \begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$

$I_{EV} = \begin{bmatrix} 1 & -2 \\ 3 & 1 \end{bmatrix}$

Where V = Eigenvectors of A

$I_{VE} = (1/7) \begin{bmatrix} 1 & 2 \\ -3 & 1 \end{bmatrix}$

$A_{VV} = \begin{bmatrix} 5 & 0 \\ 0 & -2 \end{bmatrix}$

Normal Way: $A_{EE}^2 = \begin{bmatrix} 7 & 6 \\ 9 & 22 \end{bmatrix}$

New Way: $A_{EE}^2 = BA_{VV}^2B^{-1} = \begin{bmatrix} 1 & -2 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} 5^2 & 0 \\ 0 & (-2)^2 \end{bmatrix} (1/7) \begin{bmatrix} 1 & 2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 9 & 22 \end{bmatrix}$

In general: $A_{EE}^k = BA_{VV}^kB^{-1} = \begin{bmatrix} 1 & -2 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} 5^k & 0 \\ 0 & (-2)^k \end{bmatrix} (1/7) \begin{bmatrix} 1 & 2 \\ -3 & 1 \end{bmatrix}$