

1. A. Compute $C = \begin{pmatrix} -1 \\ -2 \end{pmatrix} \begin{pmatrix} 1 & -3 \end{pmatrix}$.

B. Compute the square of the Euclidian length of $\{-2, -2, -1, -2\}^T$!

C. Compute $\begin{pmatrix} 1 & 0 \\ 4 & 1 \end{pmatrix}^{-1}$.

2. A. Let $f(x) = -8x + 7$. Compute $\frac{f(5+\Delta x_n) - f(5)}{\Delta x_n}$! What is the limit of this fraction if $\Delta x_n = 1/n(-1)^n$? What is $f'(5)$?

B. Study the monotonicity and the limit of the following sequences!

a) $\frac{-2n}{3n+6}$, b) $\frac{3}{n^2}(-1)^n$.

3.A. Compute the limit of the following sequence! $a_n = \left(1 + \frac{1}{-3n}\right)^{-n+7} \left(\frac{-2n}{-3n+1}\right)$.

B. Let $\phi(x) = 3x + 2$, $x_0 = 3$, $x_{n+1} = \phi(x_n)$. What are ϕ^{-1} and $\phi^n(1) = x_n$?

1. Compute ϕ^{-1} !

2. Find the fixed point x_f of ϕ !

3. Compute x_n !

4. A. Let $\bar{v}_1 = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$, $\bar{v}_2 = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$, $\begin{pmatrix} 12 \\ 82 \end{pmatrix} = \alpha\bar{v}_1 + \beta\bar{v}_2$. Compute $\begin{pmatrix} \alpha \\ \beta \end{pmatrix}$!

B. Let $T = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$

1. Find an eigenvector \bar{v}_1 corresponding to the eigenvalue $\lambda_1 = 3$!

2. Find the eigenvalue λ_2 of T corresponding to the eigenvector $\bar{v}_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$!

3. Calculate α and β in $\begin{pmatrix} 1 \\ 0 \end{pmatrix} = \alpha\bar{v}_1 + \beta\bar{v}_2$!

4. Calculate $T(\alpha\bar{v}_1 + \beta\bar{v}_2)$, $T^2(\alpha\bar{v}_1 + \beta\bar{v}_2)$, etc.