Lineare DGL-Systeme

Stufe 1: Eigenwerte

Name: _____ Datum: _____

Bestimme die Eigenwerte der Systemmatrix A des Systems $\dot{x} = A \cdot x$.

1) $\vec{x}' = \begin{pmatrix} 4 & -5 \\ 0 & -1 \end{pmatrix} \vec{x}$ _____

2) $\vec{x}' = \begin{pmatrix} 1 & -4 \\ 0 & -1 \end{pmatrix} \vec{x}$ _____

3) $\vec{x}' = \begin{pmatrix} 3 & 6 \\ 0 & -3 \end{pmatrix} \vec{x}$ _____

4) $\vec{x}' = \begin{pmatrix} 4 & 0 \\ 3 & 1 \end{pmatrix} \vec{x}$ _____

5) $\vec{x}' = \begin{pmatrix} 4 & -1 \\ 0 & 3 \end{pmatrix} \vec{x}$ _____

6) $\vec{x}' = \begin{pmatrix} -4 & 3 \\ 0 & -1 \end{pmatrix} \vec{x}$ _____

7) $\vec{x}' = \begin{pmatrix} -3 & -1 \\ 0 & -4 \end{pmatrix} \vec{x}$ _____

8) $\vec{x}' = \begin{pmatrix} 4 & -1 \\ 2 & 1 \end{pmatrix} \vec{x}$ _____

9) $\vec{x}' = \begin{pmatrix} 2 & 2 \\ -1 & 5 \end{pmatrix} \vec{x}$ _____

10) $\vec{x}' = \begin{pmatrix} 2 & 4 \\ 0 & -2 \end{pmatrix} \vec{x}$ _____

Lösungen: Lineare DGL-Systeme

Stufe 1: Eigenwerte

1) $\mathrm{sp}A = 3,\ \det A = -4:\ \lambda^2 - 3\lambda - 4 = 0 \Rightarrow \lambda_1 = -1,\ \lambda_2 = 4$

2) $\mathrm{sp}A = 0,\ \det A = -1:\ \lambda^2 - 1 = 0 \Rightarrow \lambda_1 = -1,\ \lambda_2 = 1$

3) $\mathrm{sp}A = 0,\ \det A = -9:\ \lambda^2 - 9 = 0 \Rightarrow \lambda_1 = -3,\ \lambda_2 = 3$

4) $\mathrm{sp}A = 5,\ \det A = 4:\ \lambda^2 - 5\lambda + 4 = 0 \Rightarrow \lambda_1 = 1,\ \lambda_2 = 4$

5) $\mathrm{sp}A = 7,\ \det A = 12:\ \lambda^2 - 7\lambda + 12 = 0 \Rightarrow \lambda_1 = 3,\ \lambda_2 = 4$

6) $\mathrm{sp}A = -5,\ \det A = 4:\ \lambda^2 + 5\lambda + 4 = 0 \Rightarrow \lambda_1 = -4,\ \lambda_2 = -1$

7) $\mathrm{sp}A = -7,\ \det A = 12:\ \lambda^2 + 7\lambda + 12 = 0 \Rightarrow \lambda_1 = -4,\ \lambda_2 = -3$

8) $\mathrm{sp}A = 5,\ \det A = 6:\ \lambda^2 - 5\lambda + 6 = 0 \Rightarrow \lambda_1 = 2,\ \lambda_2 = 3$

9) $\mathrm{sp}A = 7,\ \det A = 12:\ \lambda^2 - 7\lambda + 12 = 0 \Rightarrow \lambda_1 = 3,\ \lambda_2 = 4$

10) $\mathrm{sp}A = 0,\ \det A = -4:\ \lambda^2 - 4 = 0 \Rightarrow \lambda_1 = -2,\ \lambda_2 = 2$