Definitheit und Hesse-Matrix

Stufe 1: 2×2 einordnen

Name: _____ Datum: _____

Entscheide, ob die symmetrische Matrix positiv definit, negativ definit, semidefinit oder indefinit ist.

1) $A = \begin{pmatrix} -3 & -4 \\ -4 & 1 \end{pmatrix}$ _____

2) $A = \begin{pmatrix} 2 & 3 \\ 3 & 2 \end{pmatrix}$ _____

3) $A = \begin{pmatrix} 2 & -1 \\ -1 & 4 \end{pmatrix}$ _____

4) $A = \begin{pmatrix} 9 & 6 \\ 6 & 4 \end{pmatrix}$ _____

5) $A = \begin{pmatrix} -2 & -4 \\ -4 & -2 \end{pmatrix}$ _____

6) $A = \begin{pmatrix} 9 & -6 \\ -6 & 4 \end{pmatrix}$ _____

7) $A = \begin{pmatrix} -18 & 6 \\ 6 & -2 \end{pmatrix}$ _____

8) $A = \begin{pmatrix} 4 & 3 \\ 3 & 1 \end{pmatrix}$ _____

9) $A = \begin{pmatrix} -8 & 4 \\ 4 & -2 \end{pmatrix}$ _____

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

11) $A = \begin{pmatrix} 8 & 4 \\ 4 & 2 \end{pmatrix}$ _____

12) $A = \begin{pmatrix} 5 & -4 \\ -4 & 6 \end{pmatrix}$ _____

13) $A = \begin{pmatrix} 4 & -3 \\ -3 & 6 \end{pmatrix}$ _____

14) $A = \begin{pmatrix} -6 & -1 \\ -1 & -3 \end{pmatrix}$ _____

15) $A = \begin{pmatrix} 5 & -4 \\ -4 & -4 \end{pmatrix}$ _____

16) $A = \begin{pmatrix} -1 & 1 \\ 1 & 1 \end{pmatrix}$ _____

17) $A = \begin{pmatrix} 3 & -3 \\ -3 & 5 \end{pmatrix}$ _____

18) $A = \begin{pmatrix} -5 & -4 \\ -4 & -5 \end{pmatrix}$ _____

19) $A = \begin{pmatrix} 4 & -4 \\ -4 & 2 \end{pmatrix}$ _____

20) $A = \begin{pmatrix} -6 & -2 \\ -2 & -4 \end{pmatrix}$ _____

21) $A = \begin{pmatrix} -1 & -3 \\ -3 & -5 \end{pmatrix}$ _____

22) $A = \begin{pmatrix} -4 & 3 \\ 3 & -3 \end{pmatrix}$ _____

Lösungen: Definitheit und Hesse-Matrix

Stufe 1: 2×2 einordnen

1) $a_{11} = -3,\ \det A = -3 - 16 = -19 \Rightarrow$ indefinit

2) $a_{11} = 2,\ \det A = 4 - 9 = -5 \Rightarrow$ indefinit

3) $a_{11} = 2,\ \det A = 8 - 1 = 7 \Rightarrow$ positiv definit

4) $a_{11} = 9,\ \det A = 36 - 36 = 0 \Rightarrow$ positiv semidefinit

5) $a_{11} = -2,\ \det A = 4 - 16 = -12 \Rightarrow$ indefinit

6) $a_{11} = 9,\ \det A = 36 - 36 = 0 \Rightarrow$ positiv semidefinit

7) $a_{11} = -18,\ \det A = 36 - 36 = 0 \Rightarrow$ negativ semidefinit

8) $a_{11} = 4,\ \det A = 4 - 9 = -5 \Rightarrow$ indefinit

9) $a_{11} = -8,\ \det A = 16 - 16 = 0 \Rightarrow$ negativ semidefinit

10) $a_{11} = -4,\ \det A = 8 - 0 = 8 \Rightarrow$ negativ definit

11) $a_{11} = 8,\ \det A = 16 - 16 = 0 \Rightarrow$ positiv semidefinit

12) $a_{11} = 5,\ \det A = 30 - 16 = 14 \Rightarrow$ positiv definit

13) $a_{11} = 4,\ \det A = 24 - 9 = 15 \Rightarrow$ positiv definit

14) $a_{11} = -6,\ \det A = 18 - 1 = 17 \Rightarrow$ negativ definit

15) $a_{11} = 5,\ \det A = -20 - 16 = -36 \Rightarrow$ indefinit

16) $a_{11} = -1,\ \det A = -1 - 1 = -2 \Rightarrow$ indefinit

17) $a_{11} = 3,\ \det A = 15 - 9 = 6 \Rightarrow$ positiv definit

18) $a_{11} = -5,\ \det A = 25 - 16 = 9 \Rightarrow$ negativ definit

19) $a_{11} = 4,\ \det A = 8 - 16 = -8 \Rightarrow$ indefinit

20) $a_{11} = -6,\ \det A = 24 - 4 = 20 \Rightarrow$ negativ definit

21) $a_{11} = -1,\ \det A = 5 - 9 = -4 \Rightarrow$ indefinit

22) $a_{11} = -4,\ \det A = 12 - 9 = 3 \Rightarrow$ negativ definit