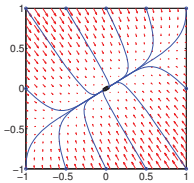
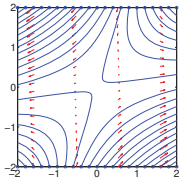
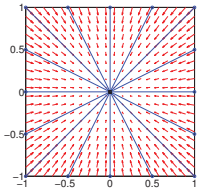
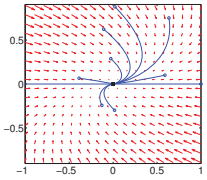
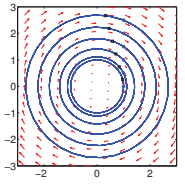
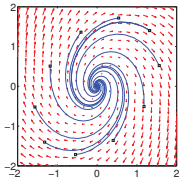
| Eigenvalues | | Diag. | Type | Stability | Portrait | Example |
|---|---|---|---|---|---|---|
| $\lambda_1, \lambda_2 \in \mathbb{R}$ | $\lambda_1 < \lambda_2 < 0$ | yes | nodal sink (node) | a.-stable |  | $A = \begin{pmatrix} -1 & 1 \\ 1 & -2 \end{pmatrix}$ |
| | $\lambda_1 > \lambda_2 > 0$ | | nodal source (node) | unstable | | $A = \begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}$ |
| $\lambda_1, \lambda_2 \in \mathbb{R}$ | $\lambda_1 < 0,\ \lambda_2 > 0$ | yes | saddle node | unstable |  | $A = \begin{pmatrix} 4 & -2 \\ 1 & -3 \end{pmatrix}$ |
| $\lambda_1, \lambda_2 \in \mathbb{R}$ | $\lambda_1 = \lambda_2 < 0$ | yes | star point | a.-stable |  | $A = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$ |
| | $\lambda_1 = \lambda_2 > 0$ | | star point | unstable | | $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ |
| $\lambda_1, \lambda_2 \in \mathbb{R}$ | $\lambda_1 = \lambda_2 < 0$ | no | improper node | a.-stable |  | $A = \begin{pmatrix} -1 & 1 \\ 0 & -1 \end{pmatrix}$ |
| | $\lambda_1 = \lambda_2 > 0$ | | improper node | unstable | | $A = \begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}$ |
| $\lambda_1 = \bar{\lambda}_2 \in \mathbb{C}$ | $\Re(\lambda_{1,2}) = 0$ | yes | center | stable |  | $A = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ |
| $\lambda_1 = \bar{\lambda}_2 \in \mathbb{C}$ | $\Re(\lambda_{1,2}) < 0$ | yes | spiral point | a.-stable |  | $A = \begin{pmatrix} -1 & -3 \\ 5 & -2 \end{pmatrix}$ |
| | $\Re(\lambda_{1,2}) > 0$ | | spiral point | unstable | | $A = \begin{pmatrix} 1 & 3 \\ -5 & 2 \end{pmatrix}$ |