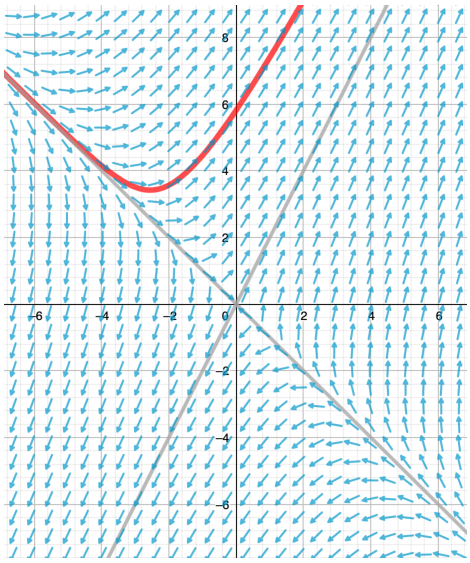
1.

$$\begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$$

$$\lambda_1 = 5 \qquad \vec{v}_1 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$$\lambda_2 = -1 \qquad \vec{v}_2 = \begin{pmatrix} -1 \\ 1 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} 1 \\ 2 \end{pmatrix} e^{5t} + c_2 \begin{pmatrix} -1 \\ 1 \end{pmatrix} e^{-t}$$



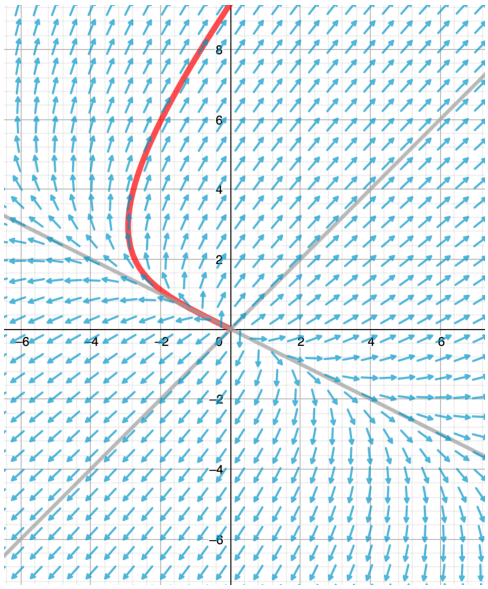
2.

$$\begin{pmatrix} 2 & 2 \\ 1 & 3 \end{pmatrix}$$

$$\lambda_1 = 4 \qquad \vec{v}_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\lambda_2 = 1 \qquad \vec{v}_2 = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} 1 \\ 1 \end{pmatrix} e^{4t} + c_2 \begin{pmatrix} -2 \\ 1 \end{pmatrix} e^{t}$$



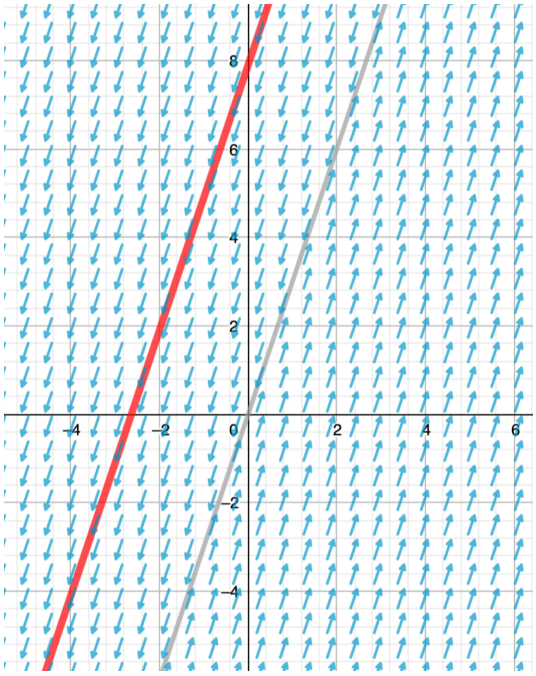
3.

$$\begin{pmatrix} 3 & -1 \\ 9 & -3 \end{pmatrix}$$

$$\lambda_{1,2} = 0 \qquad \vec{v}_1 = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$\vec{w} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} 1 \\ 3 \end{pmatrix} + c_2 \begin{pmatrix} 1 + t \\ 2 + 3t \end{pmatrix}$$



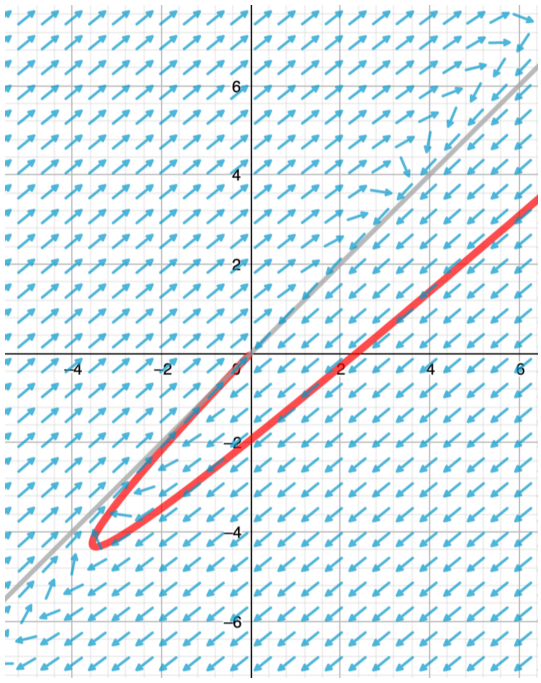
4.

$$\begin{pmatrix} -6 & 5 \\ -5 & 4 \end{pmatrix}$$

$$\lambda_{1,2} = -1 \qquad \vec{v}_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\vec{w} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} 1 \\ 1 \end{pmatrix} e^{-t} + c_2 \begin{pmatrix} 1 + t \\ 2 + t \end{pmatrix} e^{-t}$$



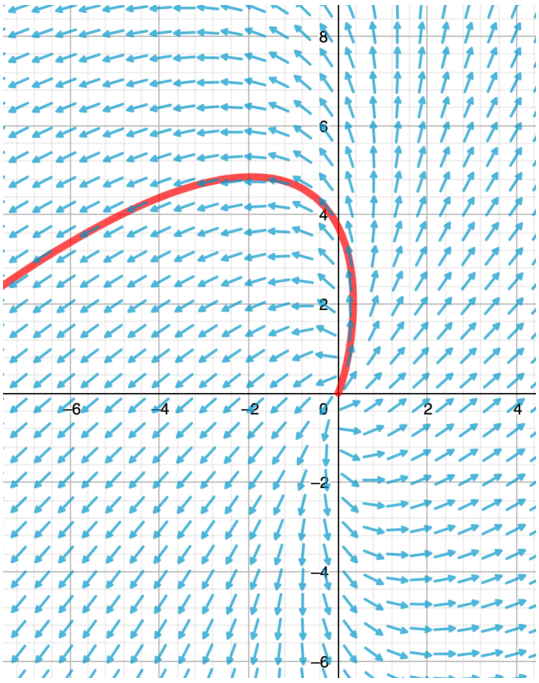
5.

$$\begin{pmatrix} 6 & -1 \\ 5 & 2 \end{pmatrix}$$

$$\lambda_1 = 4 + i \qquad \vec{v}_1 = \begin{pmatrix} 2+i \\ 5 \end{pmatrix}$$

$$\lambda_2 = 4 - i \qquad \vec{v}_2 = \begin{pmatrix} 2-i \\ 5 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} 2\cos t - \sin t \\ 5\cos t \end{pmatrix} e^{4t} + c_2 \begin{pmatrix} 2\sin 4t - \cos 4t \\ 5\sin 4t \end{pmatrix} e^{4t}$$



6.

$$\begin{pmatrix} 1 & 1 \\ -2 & -1 \end{pmatrix}$$

$$\lambda_1 = \quad i \qquad \vec{v}_1 = \begin{pmatrix} -1-i \\ 2 \end{pmatrix}$$

$$\lambda_2 = -i \qquad \vec{v}_2 = \begin{pmatrix} -1+i \\ 2 \end{pmatrix}$$

$$\vec{x} = c_1 \begin{pmatrix} \sin t - \cos t \\ 2\cos t \end{pmatrix} + c_2 \begin{pmatrix} \cos t - \sin t \\ 2\sin t \end{pmatrix}$$