Gama Marius Catalin Gr. 913 08/05/2020

$$solve\left(\left\{x-2\cdot x\cdot y,\ \frac{x^2}{2}-y\right\}\right);$$

$$\{x=0,y=0\},\left\{x=1,y=\frac{1}{2}\right\},\left\{x=-1,y=\frac{1}{2}\right\} \tag{1}$$

$$with(linalg):with(DEtools):with(VectorCalculus):$$

$$Jm:=Jacobian\left(\left[x-2\cdot x\cdot y,\ \frac{x^2}{2}-y\right],[x,y]\right);$$

$$Jm:=\begin{bmatrix}-2y+1 & -2x\\ x & -1\end{bmatrix} \tag{2}$$

$$A1:=subs([x=0,y=0],Jm);$$

$$A1:=\begin{bmatrix}1 & 0\\ 0 & -1\end{bmatrix} \tag{3}$$

$$eigenvalues(A1);$$

$$1,-1 \tag{4}$$

$$A2:=subs\left(\left[x=1,y=\frac{1}{2}\right],Jm\right);$$

$$A2:=\begin{bmatrix}0 & -2\\ 1 & -1\end{bmatrix} \tag{5}$$

$$eigenvalues(A2);$$

$$-\frac{1}{2}+\frac{I\sqrt{7}}{2},-\frac{1}{2}-\frac{I\sqrt{7}}{2} \tag{6}$$

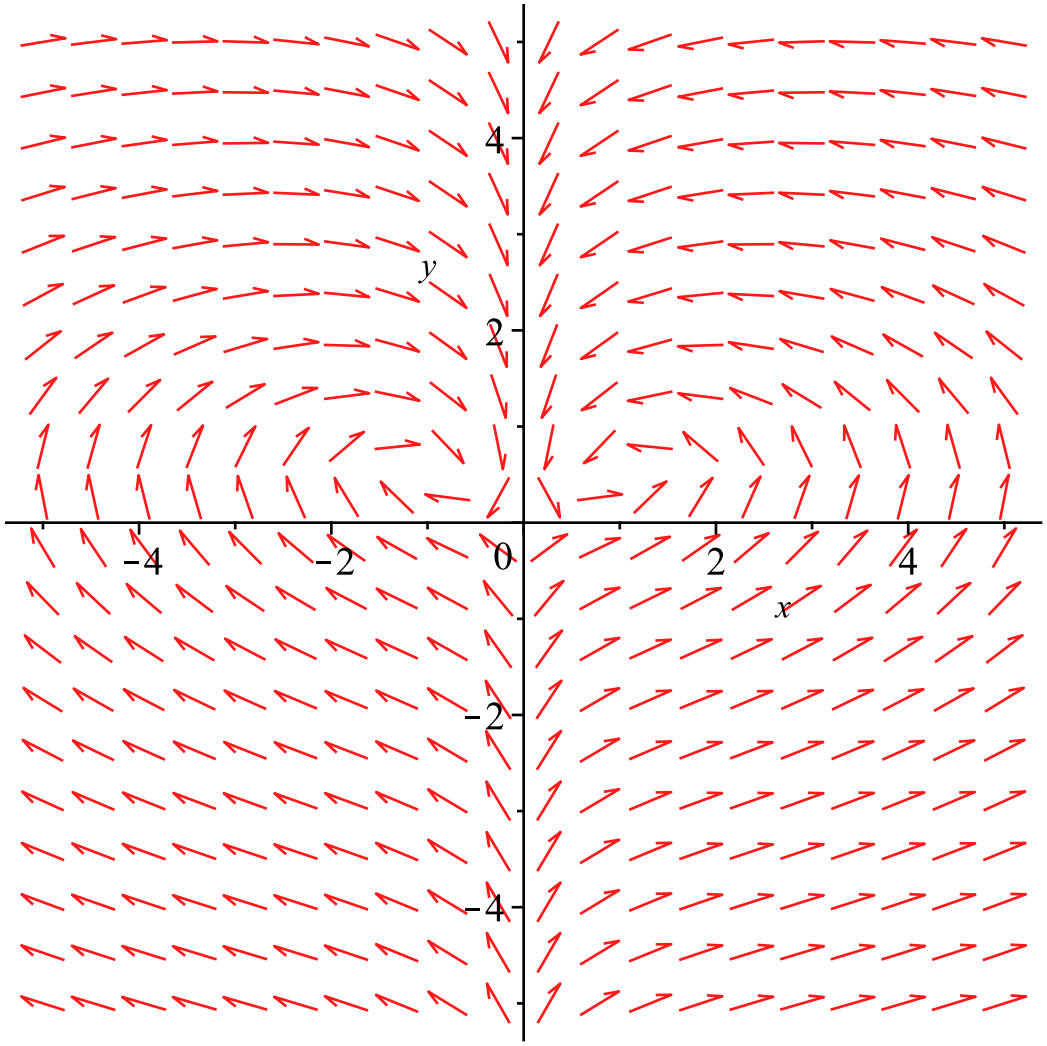
$$A3:=subs\left(\left[x=-1,y=\frac{1}{2}\right],Jm\right);$$

$$A3:=\begin{bmatrix}0 & 2\\ -1 & -1\end{bmatrix} \tag{7}$$

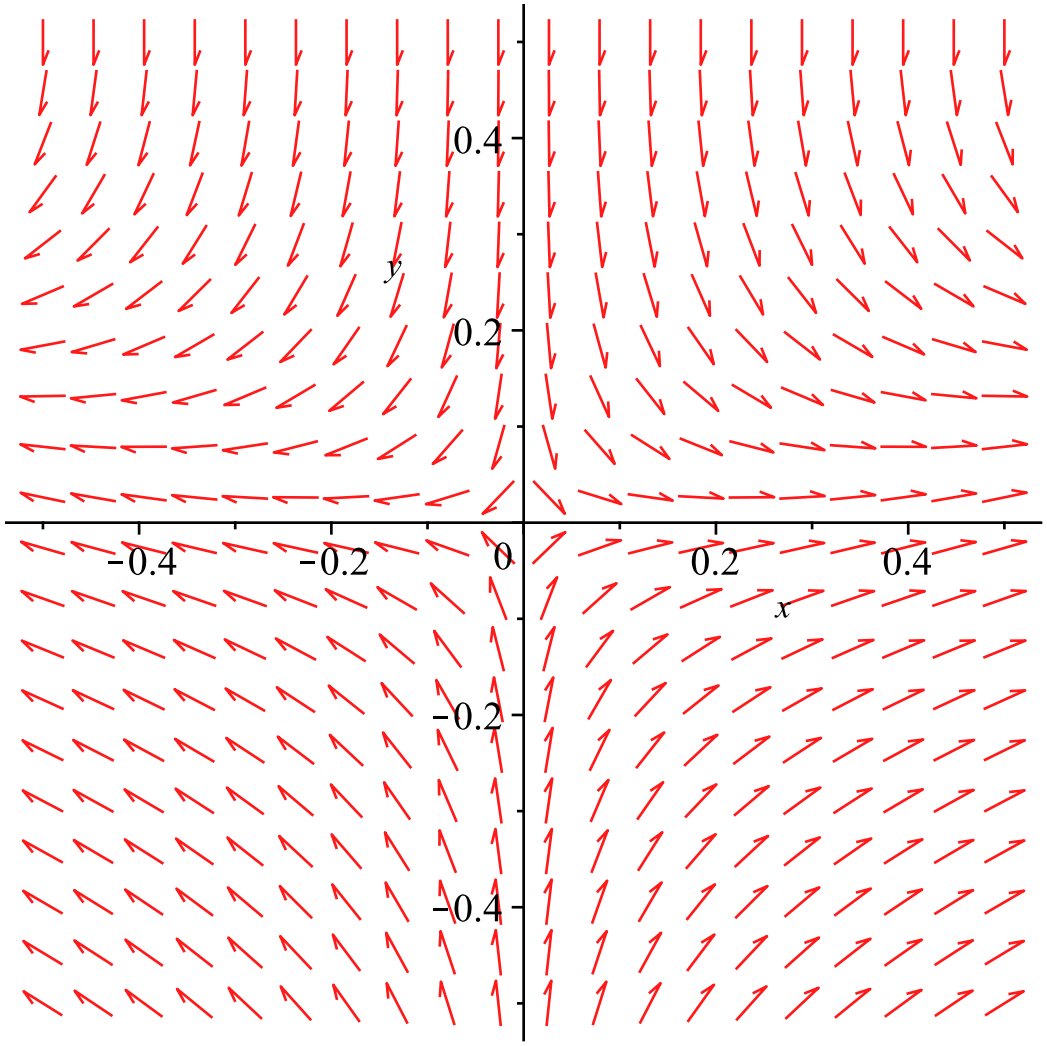
$$eigenvalues(A3);$$

$$-\frac{1}{2}+\frac{I\sqrt{7}}{2},-\frac{1}{2}-\frac{I\sqrt{7}}{2} \tag{8}$$

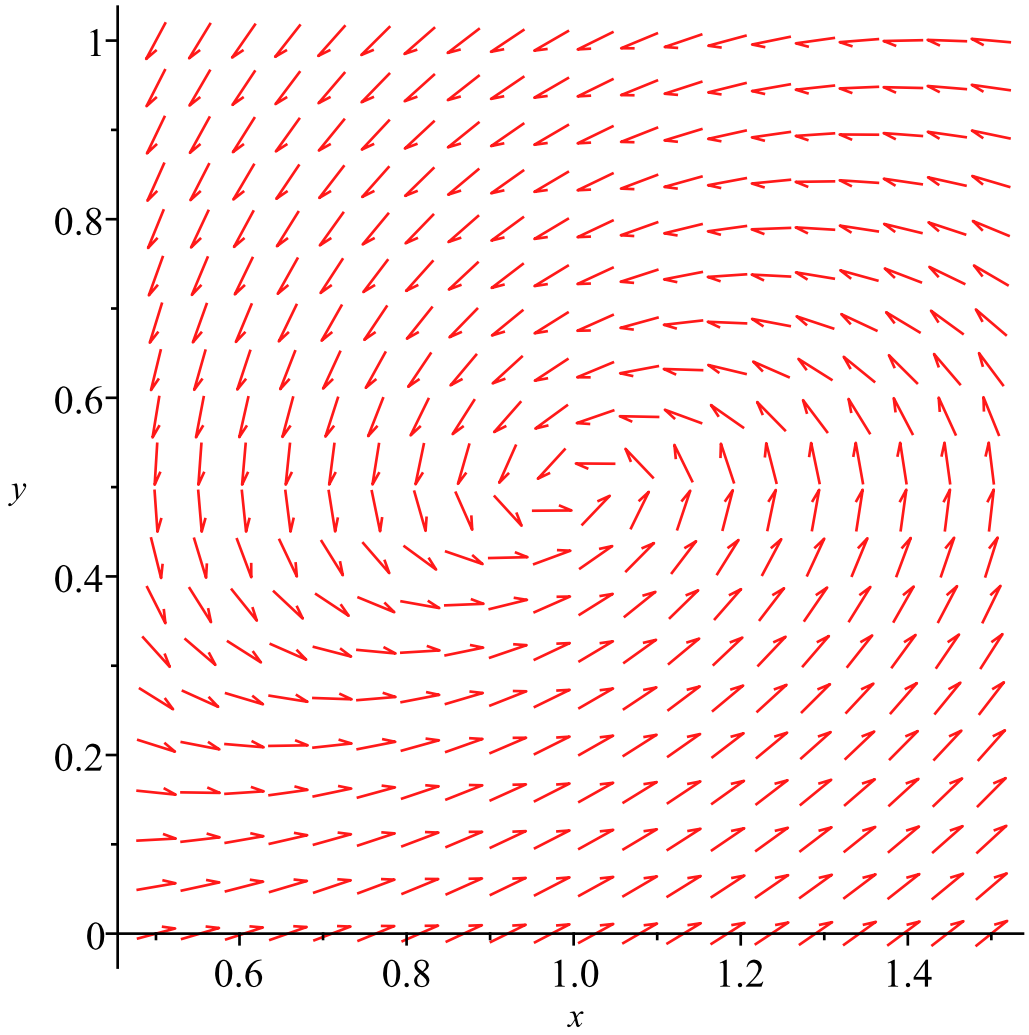
$$dfieldplot\left(\left[diff(x(t),t)=x(t)-2\cdot x(t)\cdot y(t),diff(y(t),t)=\frac{x(t)^2}{2}-y(t)\right],[x(t),y(t)],t=0..1,x=-5..5,y=-5..5\right);$$



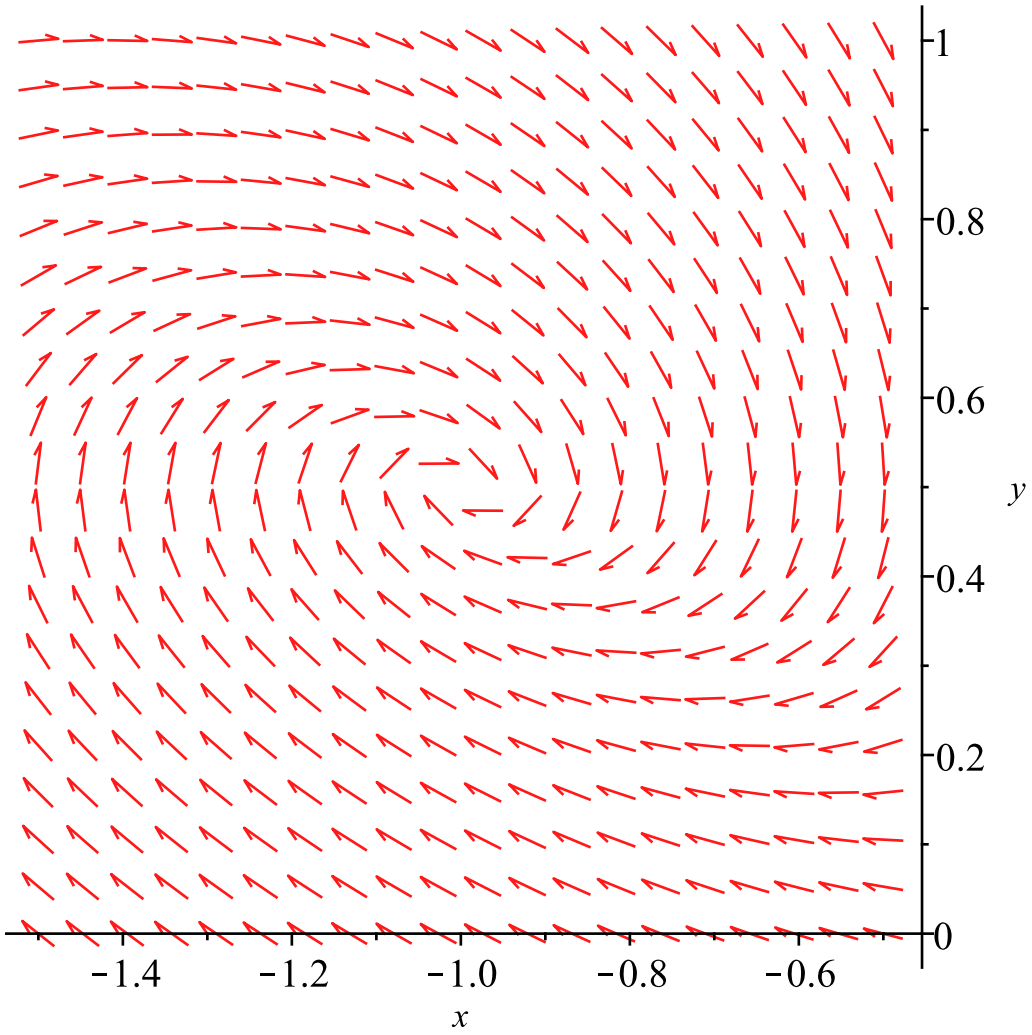
$$dfieldplot\left(\left[diff(x(t),t)=x(t)-2\cdot x(t)\cdot y(t),\ diff(y(t),t)=\frac{x(t)^2}{2}-y(t)\right],\ [x(t),y(t)],\ t=0..1,\ x=-0.5..0.5,\ y=-0.5..0.5\right);$$



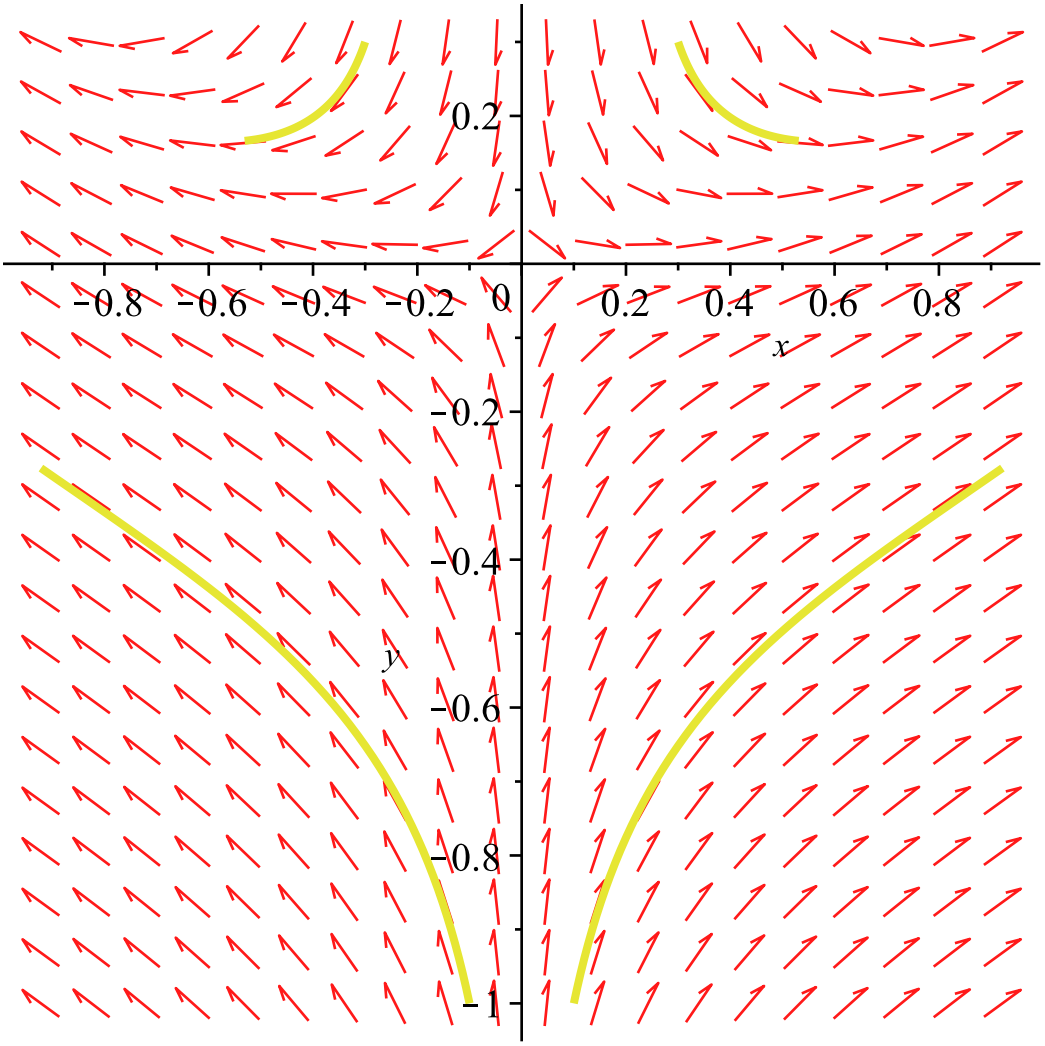
$$dfieldplot\left(\left[diff(x(t),t)=x(t)-2\cdot x(t)\cdot y(t),\ diff(y(t),t)=\frac{x(t)^2}{2}-y(t)\right],\ [x(t),y(t)],\ t=0..1,\ x=0.5..1.5,\ y=0..1\right);$$



$$dfieldplot\left(\left[diff(x(t),t)=x(t)-2\cdot x(t)\cdot y(t),\ diff(y(t),t)=\frac{x(t)^2}{2}-y(t)\right],\ [x(t),y(t)],\ t=0..1,\ x=-1.5..-0.5,\ y=0..1\right);$$



$$DEplot\left(\left[diff(x(t),t)=x(t)-2\cdot x(t)\cdot y(t),\ diff(y(t),t)=\frac{x(t)^2}{2}-y(t)\right],\ [x(t),y(t)],\ t=0..1,\ [[x(0)=0.1,y(0)=1],\ [x(0)=-0.1,y(0)=1],\ [x(0)=0.3,y(0)=0.3],\ [x(0)=-0.3,y(0)=0.3]]\right);$$


0.2
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
x
−0.2
−0.4
y
−0.6
−0.8
−1