> $f := (x, y) \rightarrow 2 \cdot x - x^2 - x \cdot y$

$$f := (x, y) \mapsto 2 \cdot x - x^2 - y \cdot x \quad \textbf{(1)}$$

> $g := (x, y) \rightarrow -y + x \cdot y$

$$g := (x, y) \mapsto -y + y \cdot x \quad \textbf{(2)}$$

> ?*solve*

> $solve(\{2 \cdot x - x^2 - x \cdot y = 0, -y + x \cdot y = 0\})$

$$\{x = 0, y = 0\}, \{x = 2, y = 0\}, \{x = 1, y = 1\} \quad \textbf{(3)}$$

> *with*(*linalg*) :

> *with*(*VectorCalculus*) :

> $Jm := Jacobian([f(x, y), g(x, y)], [x, y])$

$$Jm := \begin{bmatrix} -2\,x - y + 2 & -x \\ y & x - 1 \end{bmatrix} \quad \textbf{(4)}$$

> $A := subs([x = 0, y = 0], Jm)$

$$A := \begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix} \quad \textbf{(5)}$$

> *eigenvalues*(A)

$$2, -1 \quad \textbf{(6)}$$

> $A := subs([x = 2, y = 0], Jm)$

$$A := \begin{bmatrix} -2 & -2 \\ 0 & 1 \end{bmatrix} \quad \textbf{(7)}$$

> *eigenvalues*(A)

$$-2, 1 \quad \textbf{(8)}$$

> $A := subs([x = 1, y = 1], Jm)$

$$A := \begin{bmatrix} -1 & -1 \\ 1 & 0 \end{bmatrix} \quad \textbf{(9)}$$

> *eigenvalues*(A)

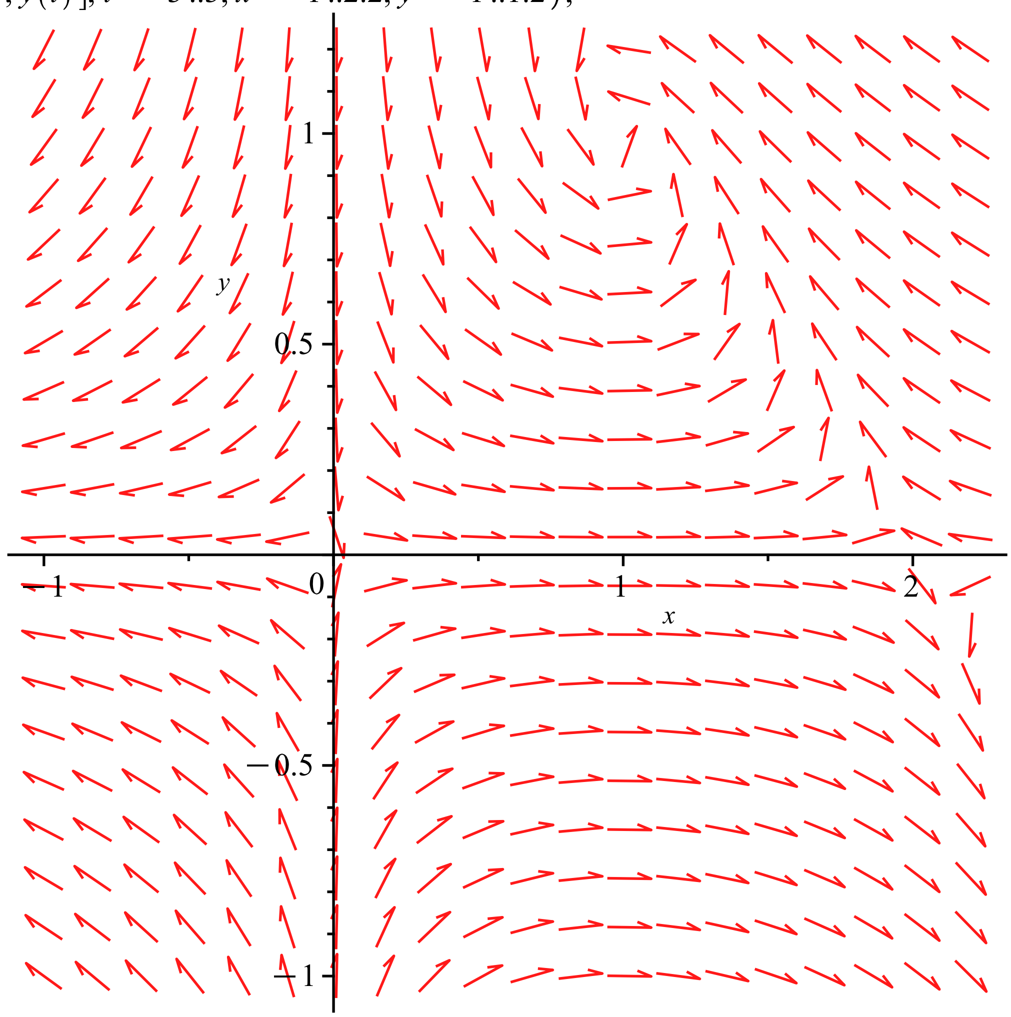
$$-\frac{1}{2} + \frac{\mathrm{I}\sqrt{3}}{2}, -\frac{1}{2} - \frac{\mathrm{I}\sqrt{3}}{2} \quad \textbf{(10)}$$

> # *c*

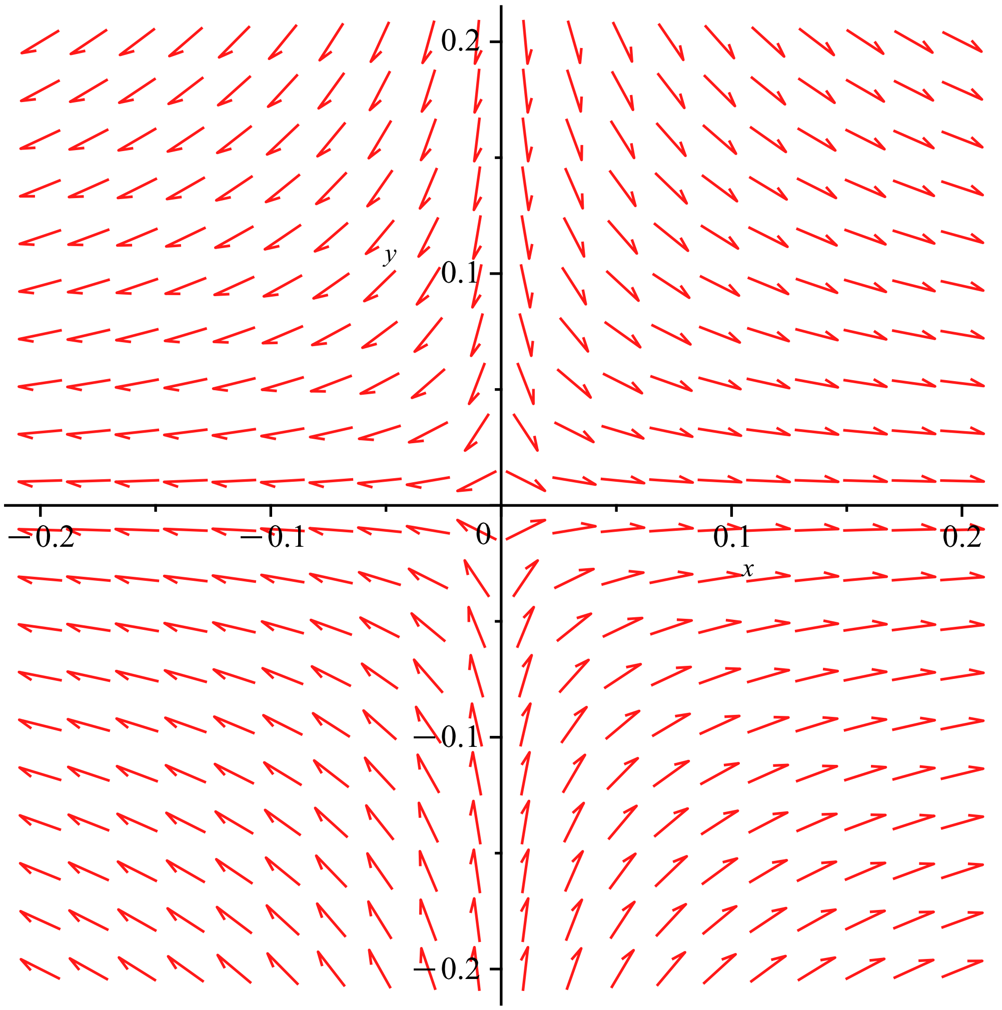
> *with*(*DEtools*)

[*AreSimilar*, *Closure*, *DEnormal*, *DEplot*, *DEplot3d*, *DEplot_polygon*, *DFactor*, *DFactorLCLM*, *DFactorsols*, *Dchangevar*, *Desingularize*, *FindODE*, *FunctionDecomposition*, *GCRD*, *Gosper*, *Heunsols*, *Homomorphisms*, *IVPsol*, *IsHyperexponential*, *LCLM*, *MeijerGsols*, *MultiplicativeDecomposition*, *ODEInvariants*, *PDEchangecoords*, *PolynomialNormalForm*, *RationalCanonicalForm*, *ReduceHyperexp*, *RiemannPsols*, *Xchange*, *Xcommutator*, *Xgauge*, *Zeilberger*, *abelsol*, *adjoint*, *autonomous*, *bernoullisol*, *buildsol*, *buildsym*, *canoni*, *caseplot*, *casesplit*, *checkrank*, *chinisol*, *clairautsol*, *constcoeffsols*, *convertAlg*, *convertsys*, **(11)** *dalembertsol*, *dcoeffs*, *de2diffop*, *dfieldplot*, *diff_table*, *diffop2de*, *dperiodic_sols*, *dpolyform*, *dsubs*, *eigenring*, *endomorphism_charpoly*, *equinv*, *eta_k*, *eulersols*, *exactsol*, *expsols*, *exterior_power*, *firint*, *firtest*, *formal_sol*, *gen_exp*, *generate_ic*, *genhomosol*, *gensys*, *hamilton_eqs*, *hypergeometricsols*, *hypergeomsols*, *hyperode*, *indicialeq*, *infgen*, *initialdata*, *integrate_sols*, *intfactor*, *invariants*, *kovacicsols*, *leftdivision*, *liesol*, *line_int*, *linearsol*, *matrixDE*, *matrix_riccati*, *maxdimsystems*, *moser_reduce*, *muchange*, *mult*, *mutest*, *newton_polygon*, *normalG2*, *ode_int_y*, *ode_y1*, *odeadvisor*, *odepde*, *parametricsol*, *particularsol*, *phaseportrait*, *poincare*, *polysols*, *power_equivalent*, *rational_equivalent*, *ratsols*, *redode*, *reduceOrder*, *reduce_order*, *regular_parts*, *regularsp*, *remove_RootOf*, *riccati_system*, *riccatisol*, *rifread*, *rifsimp*, *rightdivision*, *rtaylor*, *separablesol*, *singularities*, *solve_group*, *super_reduce*, *symgen*, *symmetric_power*, *symmetric_product*, *symtest*, *transinv*, *translate*, *untranslate*, *varparam*, *zoom*]

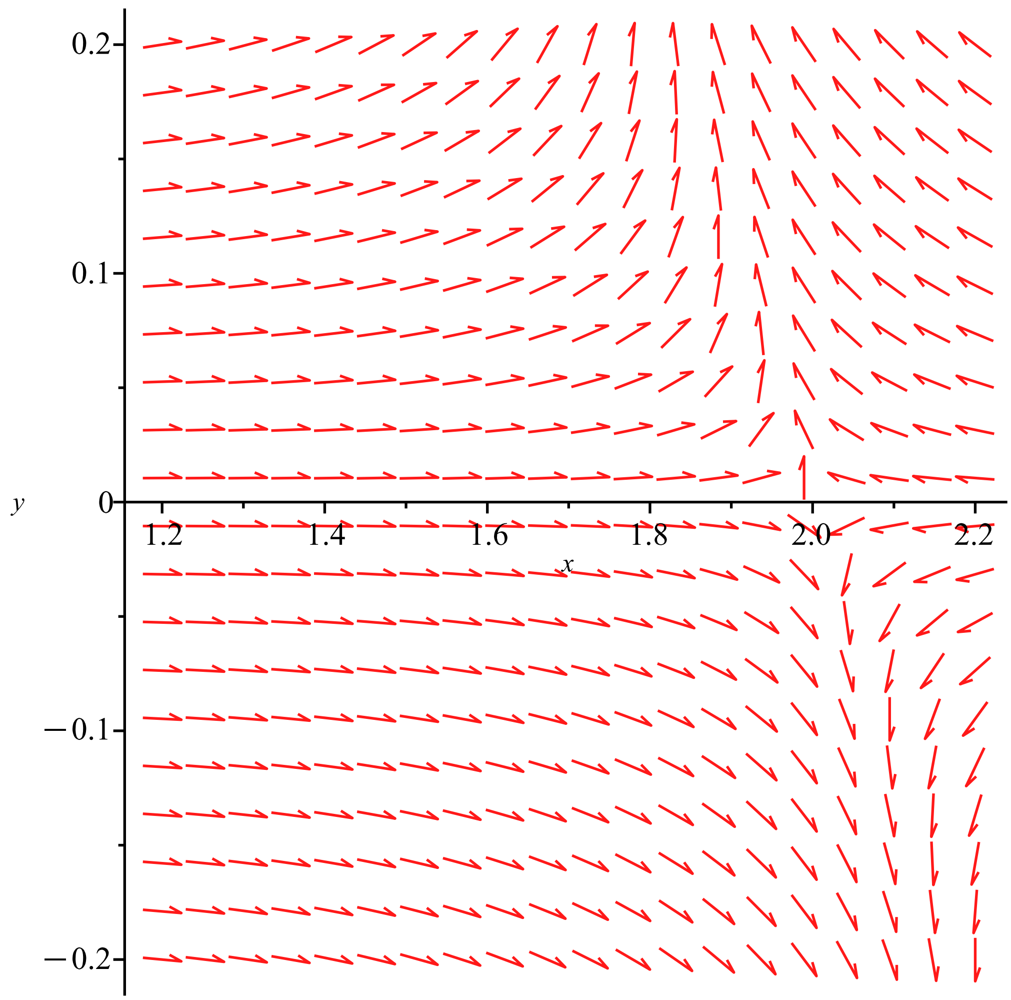
> $dfieldplot\left(\left[diff(x(t),t)=2\cdot x(t)-x(t)^2-x(t)\cdot y(t),\ diff(y(t),t)=-y(t)+x(t)\cdot y(t)\right],\left[x(t),y(t)\right],t=-3..3,x=-1..2.2,y=-1..1.2\right);$



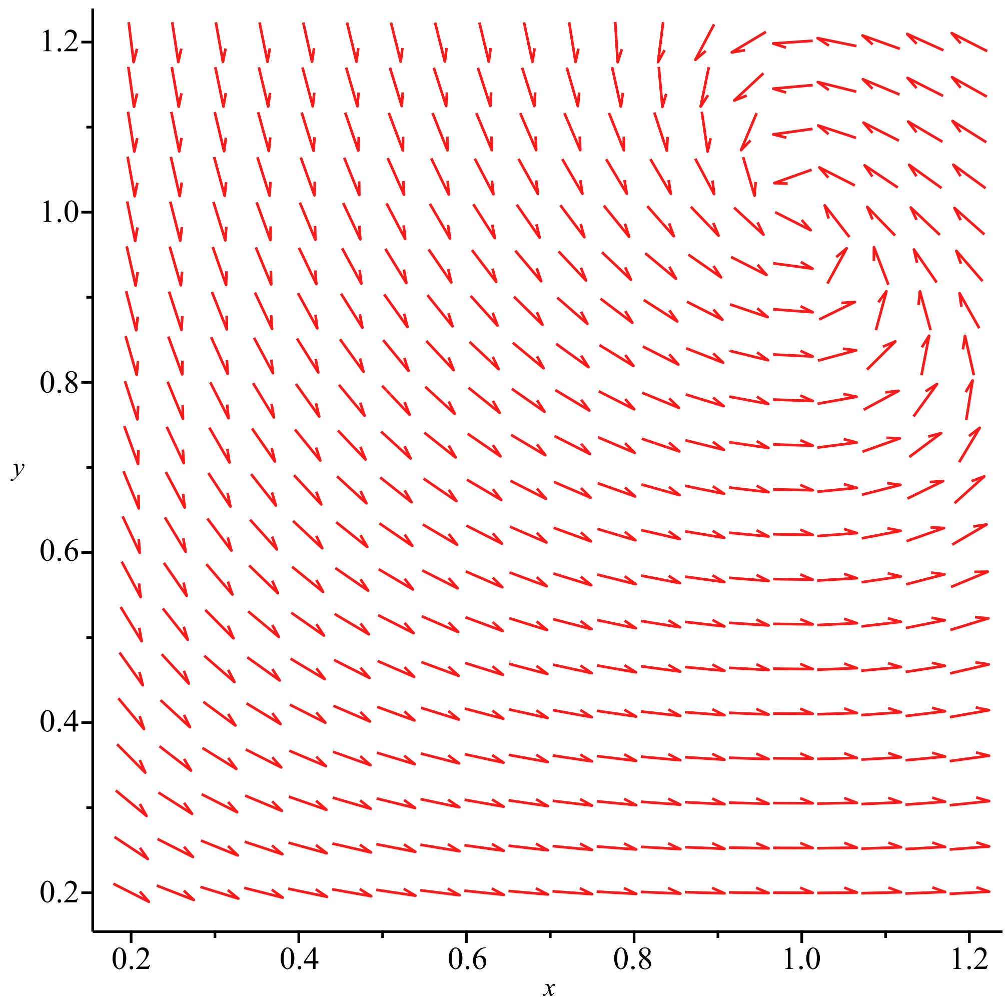
> $dfieldplot\left(\left[diff(x(t),t)=2\cdot x(t)-x(t)^2-x(t)\cdot y(t),\ diff(y(t),t)=-y(t)+x(t)\cdot y(t)\right],\left[x(t),y(t)\right],t=-3..3,x=-0.2..0.2,y=-0.2..0.2\right);$



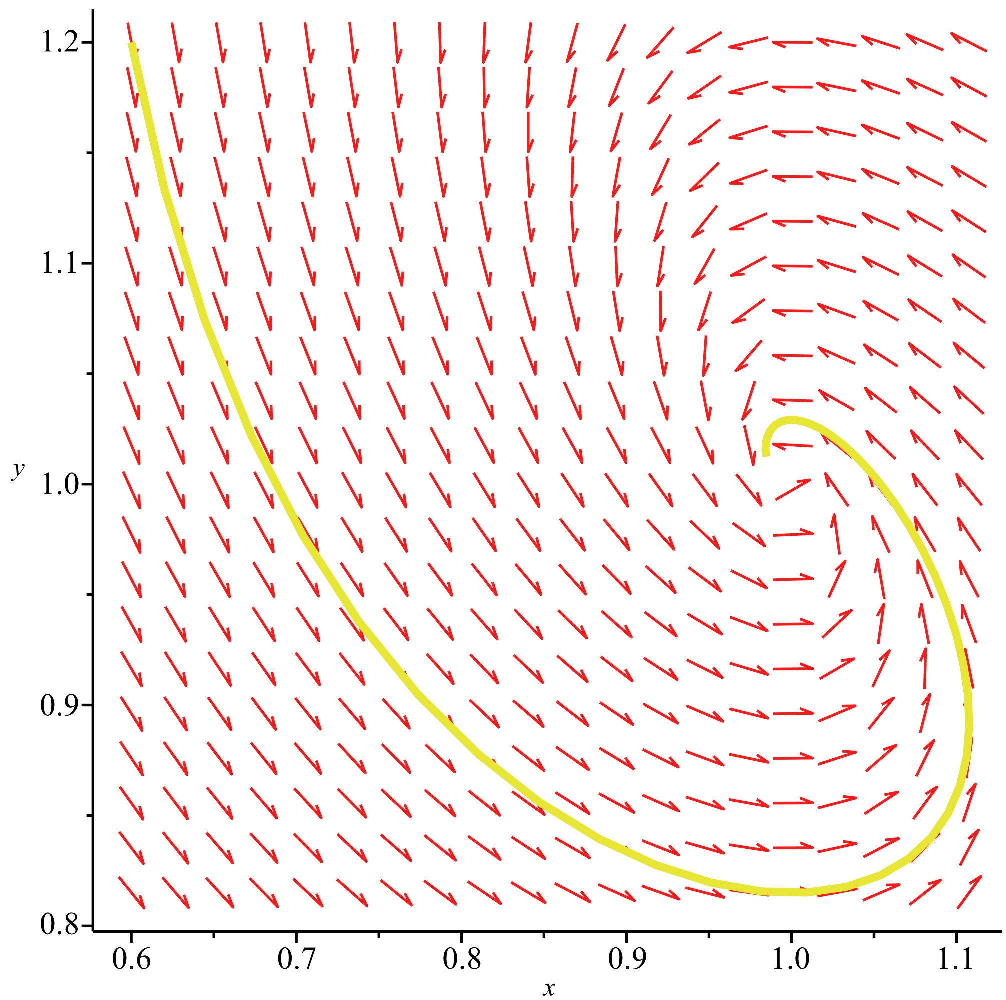
> $dfieldplot\left(\left[diff(x(t), t) = 2\cdot x(t) - x(t)^2 - x(t)\cdot y(t),\ diff(y(t), t) = -y(t) + x(t)\cdot y(t)\right], [x(t), y(t)], t = -3..3, x = 1.2..2.2, y = -0.2..0.2\right);$



> $dfieldplot\left(\left[diff(x(t),t)=2\cdot x(t)-x(t)^2-x(t)\cdot y(t),\ diff(y(t),t)=-y(t)+x(t)\cdot y(t)\right], [x(t),y(t)], t=-3..3, x=0.2..1.2, y=0.2..1.2\right);$



> $DEplot\left(\left[diff(x(t),t)=2\cdot x(t)-x(t)^2-x(t)\cdot y(t),\ diff(y(t),t)=-y(t)+x(t)\cdot y(t)\right],[x(t),y(t)],t=0..7,[[x(0)=0.6,y(0)=1.2]]\right);$



> $f := (x, y) \to y$

$$f := (x, y) \mapsto y \tag{12}$$

> $g := (x, y) \to (-4) \cdot \sin(x)$

$$g := (x, y) \mapsto (-4) \cdot \sin(x) \tag{13}$$

> $solve(\{y = 0, (-4) \cdot \sin(x) = 0\})$

$$\{x = 0, y = 0\} \tag{14}$$

> $dsolve\left(diff(y(x), x) = \frac{(-4 \cdot \sin(x))}{y(x)}, y(x)\right)$

$$y(x) = \sqrt{8\cos(x) + \_C1}, y(x) = -\sqrt{8\cos(x) + \_C1} \tag{15}$$

> $Jm := Jacobian([f(x, y), g(x, y)], [x, y])$

$$Jm := \begin{bmatrix} 0 & 1 \\ -4\cos(x) & 0 \end{bmatrix} \tag{16}$$

> $A := subs([x = 0, y = 0], Jm)$

$$A := \begin{bmatrix} 0 & 1 \\ -4\cos(0) & 0 \end{bmatrix} \tag{17}$$

> $eigenvalues(A)$

(18)

$$2\,I,\ -2\,I \tag{18}$$

>