Doing this a "too hard" way.

want to solve for the fixed points.

To make life hard, get maple to get $F(x,y) := [x^{2} + y, x(y^{2}-1)]$

> DE;

\[
\begin{align*}
\left[ D(x)(x) = x(t)^{2} + y(t), D(y)(y) = x(t) (y(t)^{2} - 1) \right]
\end{align*}
\]  

(2)

> subs( \{x(t)=X, y(t)=Y\}, DE);

\[
\begin{align*}
\left[ D(x)(x) = X^{2} + Y, D(y)(y) = X (Y^{2} - 1) \right]
\end{align*}
\]  

(3)

> rhs( "yo mama" = "so fat" );

"so fat"

(4)

> lhs( "yo mama" = "so fat" );

(5)
> stuff:=[1, 3, 2.6, 6, 9];
stuff:=[1, 3, 2.6, 6, 9]

> f:=x->x^2-2;
f:=x→x^2−2

> seq( f(stuff[i]), i=1..nops(stuff)));
[-1, 7, 4.76, 34, 79]

> map(f,stuff);
[-1, 7, 4.76, 34, 79]

> junk:=subs( {x(t)=X, y(t)=Y} , DE);
junk:= [D(x)(t) = X^2 + Y, D(y)(t) = X( Y^2 − 1 )]

> map(rhs,junk);
[X^2 + Y, X(Y^2 − 1)]

> f(x);
x^2 − 2

> f(sin(x*y)+y^2);
(sin(x*y) + y^2)^2 − 2

> g:=(x,y)->f(sin(x*y)+y^2);
g := (x, y) → f(sin(x*y) + y^2)

> h:= unapply(f(sin(x*y)+y^2), (x,y));
h := (x, y) → (sin(x*y) + y^2)^2 − 2

> g(1,Pi/2);
\left( 1 + \frac{1}{4} \pi^2 \right)^2 − 2

> h(1, Pi/2);
\left( 1 + \frac{1}{4} \pi^2 \right)^2 − 2

> f:=x->x^3;
f:=x→x^3

> g(1,Pi/2);
\left( 1 + \frac{1}{4} \pi^2 \right)^3

> h(1, Pi/2);
\left( 1 + \frac{1}{4} \pi^2 \right)^2 − 2

> DE;
[D(x)(t) = x(t)^2 + y(t), D(y)(t) = x(t) (y(t)^2 − 1) ]
> F:=unapply(map(rhs, subs( {x(t)=X, y(t)=Y} , DE)),
           (X,Y));

\[
F := (X, Y) \rightarrow [X^2 + Y, X(Y^2 - 1)]
\]  

(22)

> F(0,0);

[0, 0]  

(23)

> F(1,-1);

[0, 0]  

(24)

> DEplot(DE, [x,y], t=-4..4, x=-2..2, y=-2..2);

> F(.01,.03);

[0.0301, -0.009991]  

(25)

> F(1,-1);

[0, 0]  

(26)

> F(1+.01, -1+.03);

[0.0501, -0.059691]  

(27)
> Jacobian(F(x,y));

\[
\text{Jacobian}([x^2 + y, x (y^2 - 1)])
\]  

(28)

> with(VectorCalculus):
> Jacobian(F(x,y), [x,y]);

\[
\begin{bmatrix}
2x & 1 \\
y^2 - 1 & 2xy
\end{bmatrix}
\]  

(29)

> Jack:=unapply(Jacobian(F(x,y), [x,y]), (x,y));

\[
\begin{array}{c}
\text{Jack} := (x,y) \mapsto rtable(1..2, 1..2, \{(1, 1) = 2x, (1, 2) = 1, (2, 1) = y^2 - 1, (2, 2) = 2xy\}, \\
\text{datatype} = \text{anything}, \text{subtype} = \text{Matrix}, \text{storage} = \text{rectangular}, \text{order} = \text{Fortran\_order})
\end{array}
\]  

(30)

> Jack(a,b);

\[
\begin{bmatrix}
2a & 1 \\
b^2 - 1 & 2ab
\end{bmatrix}
\]  

(31)

> Jack(0,0);

\[
\begin{bmatrix}
0 & 1 \\
-1 & 0
\end{bmatrix}
\]  

(32)

> Jack(-1,-1);

\[
\begin{bmatrix}
-2 & 1 \\
0 & 2
\end{bmatrix}
\]  

(33)

> Jack(1,-1);

\[
\begin{bmatrix}
2 & 1 \\
0 & -2
\end{bmatrix}
\]  

(34)

> DEplot(DE, [x,y], t=-4..4, x=-2..2, y=-2..2);
> rand();
395718860534

> r20 := rand(0..20);
r20 := proc() proc() option builtin = RandNumberInterface; end proc(6, 21, 5) end proc

> r20();
5

> RandCol := () -> COLOR(RGB, r20() / 20.0, r20() / 20.0, r20() / 20.0);

   RandCol := () -> \(\text{COLOR}\left(\text{RGB}, \frac{1}{20.0}, \frac{1}{20.0}, \frac{1}{20.0}\right)\)

> RandCol();
COLOR(RGB, 0.85000000000, 0.95000000000, 0.50000000000)

> Clist := [seq(RandCol(), i = 1 .. 100)];

> DEplot(DE, [x, y], t = -4 .. 4,
   x = -2 .. 2, y = -2 .. 2,
   [seq([x(0) = 0, y(0) = k], k = -2 .. 2, .25)], linecolor = Clist);
DEplot(DE, [x,y], t=-4..4, x=-2..2, y=-2..2, [seq([x(0)=0, y(0)=k], k=-2..2,.25)], linecolor=Clist, animatecurves=true);
```
> Jack(-1,-1);

\[
\begin{bmatrix}
-2 & 1 \\
0 & 2 \\
\end{bmatrix}
\]

> with(LinearAlgebra):
> Eigenvectors(Jack(-1,-1));

\[
\begin{bmatrix}
-2 & 1 \\
2  & \frac{1}{4} \\
\end{bmatrix}
\]

> DEplot(DE, [x,y], t=-4..8,
x=-2..2, y=-2..2,
[seq([x(0)=0, y(0)=k], k=-2..2,.25),
[x(0)=-1+.025, y(0)=-1+.01]]
), linecolor=Clist);
```