

Systems on Maple

Consider the system

$$\frac{dx}{dt} = 0.5x - 0.2xy$$

$$\frac{dy}{dt} = -y + 2xy$$

To represent the system enter,

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> with(DEtools): with(plots):  
> de1 := diff(x(t),t) = .5 * x(t) - .2 * x(t) * y(t);  
> de2 := diff(y(t),t) = - y(t) + 2 * x(t) * y(t);  
> DEplot( [de1,de2] , [x(t),y(t)] , t=-5..15 , [[x(0)=1,y(0)=1]]  
          , color=black, linecolor=blue , stepsize=.25 );  
> DEplot([de1,de2] , [x(t),y(t)] , t = -5..15 ,  
          x = -1..1 , y = 0..8 , color = black );
```

Find the phase portraits of the following systems.

$$\frac{dx}{dt} = 0.8x - 0.7xy \quad \text{initial conditions } (2,5), (2,1), (2,3)$$

$$\frac{dy}{dt} = -0.9y + 0.6xy$$

$$\frac{dx}{dt} = y \quad \text{initial condition } (2,0)$$

$$\frac{dy}{dt} = -9x$$

$$\frac{dx}{dt} = (1-x/5)x - 0.8xy \quad \text{initial conditions } (3,4), (2,1)$$

$$\frac{dy}{dt} = -2y + 1.5xy$$

Done in T_EX.