

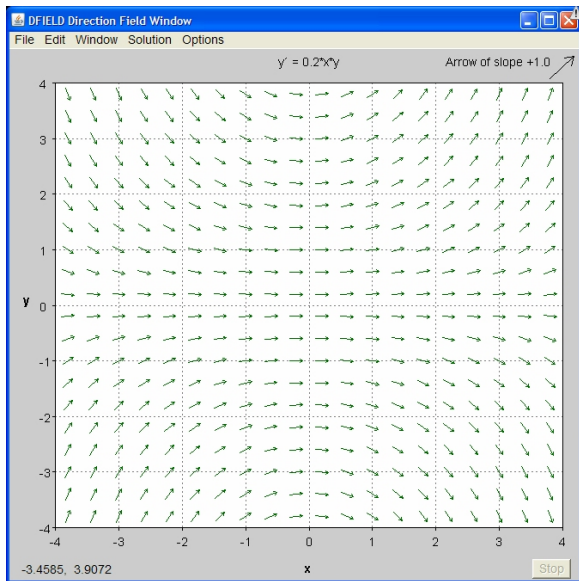
Differential Equations Notes, MATH 2066

Chapter Two, DFIELD examples

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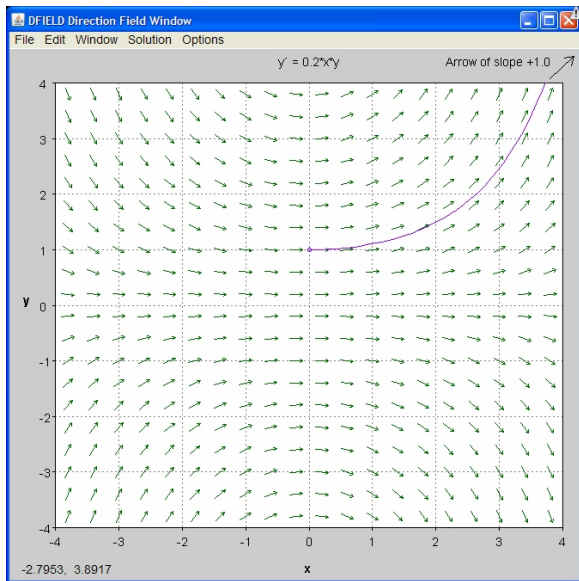
August 25, 2009

Direction Field For $y' = 0.2xy$



Direction field for
 $y' = 0.2xy$

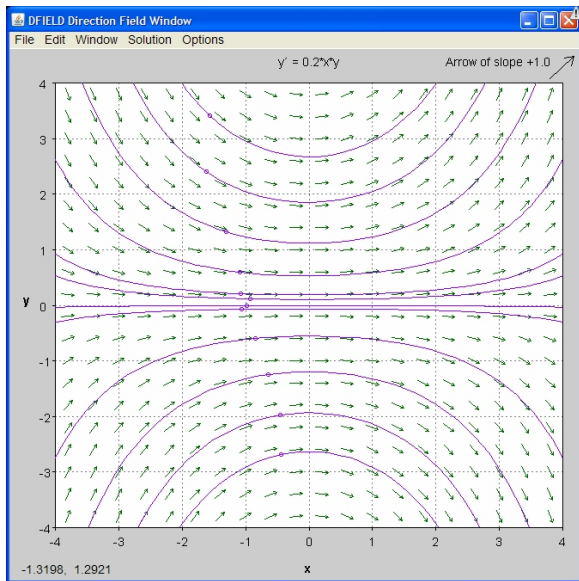
Direction Field and Solution for $y' = 0.2xy$



Direction field for
 $y' = 0.2xy$

The solution curve
with initial condition
 $y(0) = 1$ is shown.

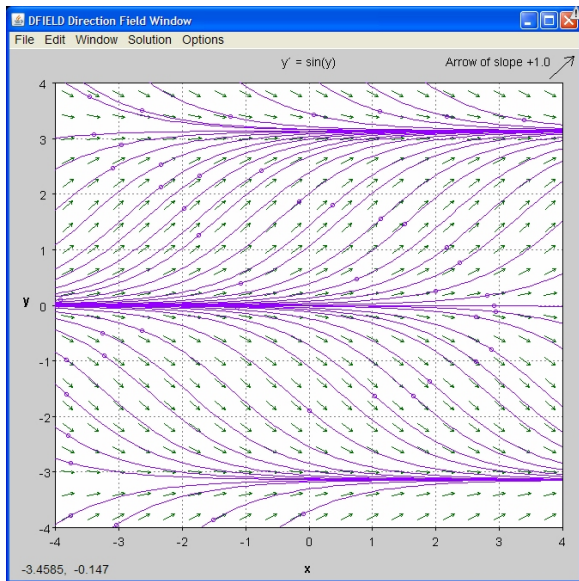
Solution Curves for $y' = 0.2xy$



Direction field for
 $y' = 0.2xy$

Several solution
curves are shown.

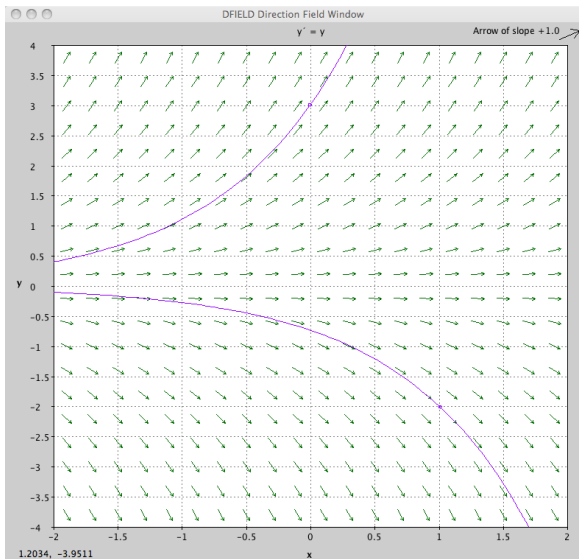
Solution Curves for $y' = \sin y$



Direction field for
 $y' = \sin y$

Several solution
curves are shown.
Note that there are
critical points at
 $y = \pm n\pi$.

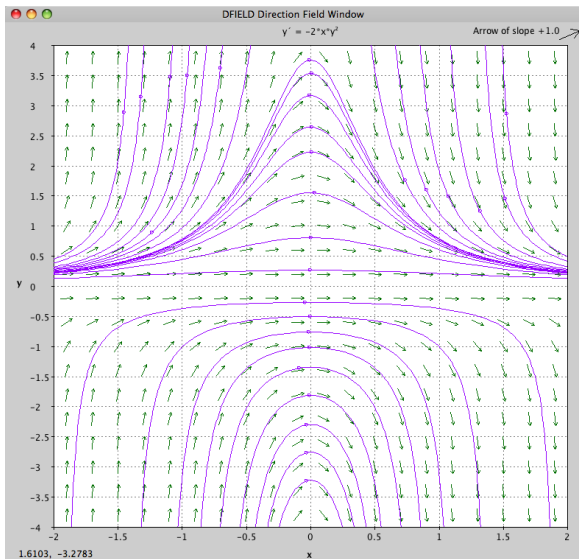
Direction Field For $y' = y$



Direction field for $y' = y$ showing solutions with initial conditions $y(0) = 3$ and $y(1) = -2$.

The solutions have the form $y = ce^x$

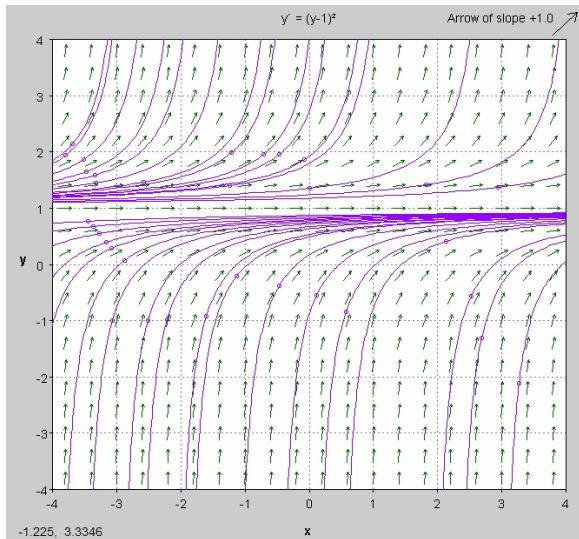
Direction Field for $y' + 2xy^2 = 0$



Direction field for $y' + 2xy^2 = 0$ showing several solutions.

The solutions have the form $y = 1/(x^2 + c)$ and there is the singular solution $y = 0$.

Direction Field For $y' = (y - 1)^2$

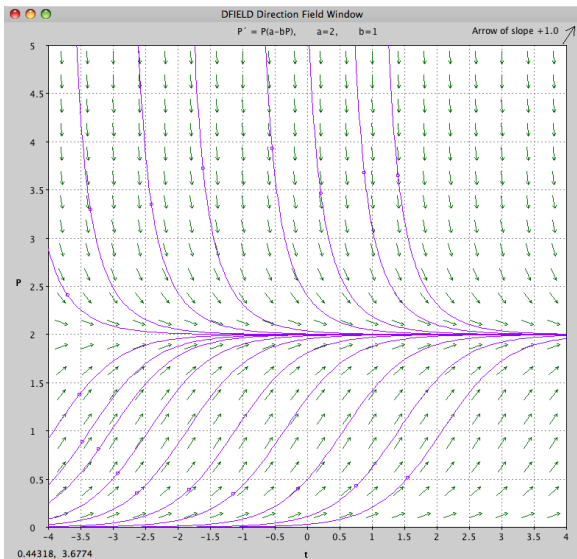


Direction field for $y' = (y - 1)^2$ showing several solutions.

The solutions have the form $y = 1 - \frac{1}{x+c}$ and there is the singular solution $y = 1$.

Vertical asymptotes cannot be predicted qualitatively.

Direction Field for $P' = P(a - bP)$



Direction field for $P' = P(a - bP)$ showing several solutions.

The parameter values are $a = 2, b = 1$.

The critical points are $P = 0$ and $P = a/b = 2$.

Phase Line

Phase line for the population DE $dP/dt = P(a - bP)$.

