

Lecture 23

Basic concept of differential equations

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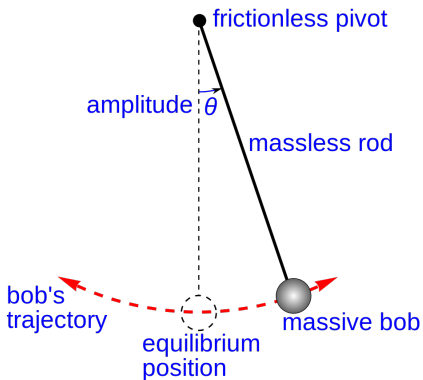
Mathematics 2 – Calculus of Functions of Several Variables
SS 2019

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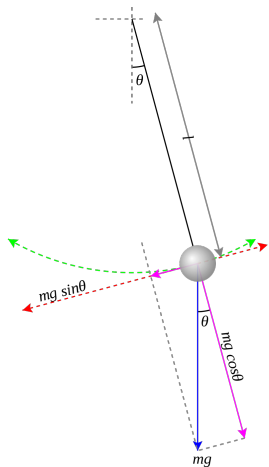


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Simple gravity pendulum

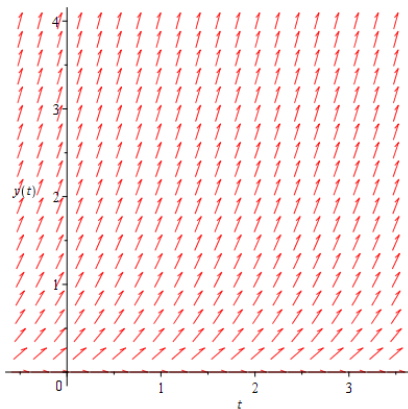


(Wikipedia)



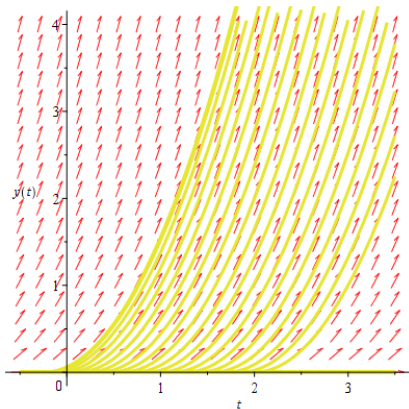
Directional fields for first order diff. eq.

$$y' = 2\sqrt{y}$$



Directional fields for first order diff. eq.

$$y' = 2\sqrt{y}$$



More examples

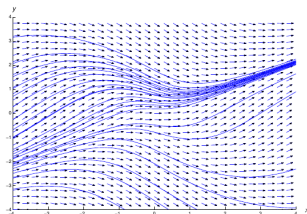


Figure 1.3.2 A direction field and integral curves

$$\text{for } y' = \frac{x^2 - y^2}{1 + x^2 + y^2}$$

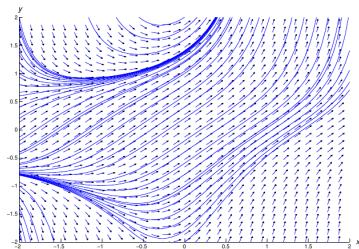


Figure 1.3.3 A direction field and integral curves for

$$y' = 1 + xy^2$$

(William F. Trench *Elem. diff. equations*)

More examples

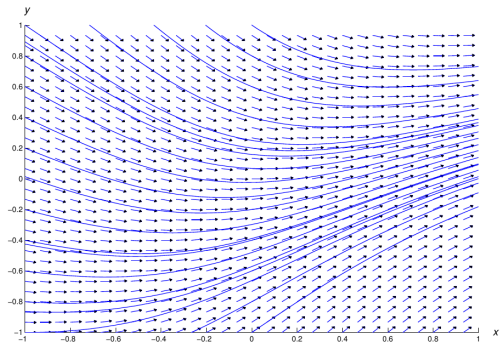


Figure 1.3.4 A direction and integral curves for $y' = \frac{x - y}{1 + x^2}$

(William F. Trench *Elem. diff. equations*)

More examples

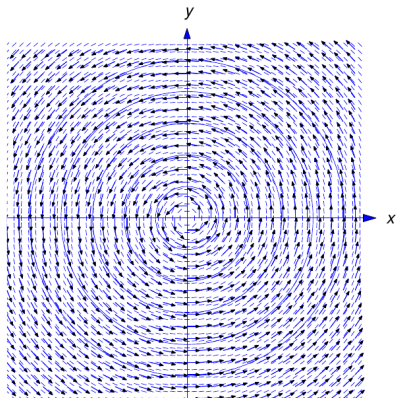


Figure 1.3.5 A direction field and integral curves for $y' = -\frac{x}{y}$

(William F. Trench *Elem. diff. equations*)

More examples

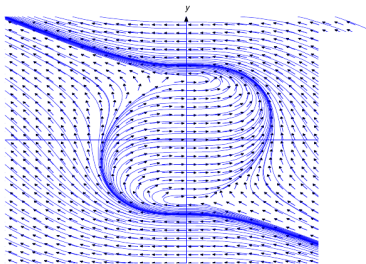


Figure 1.3.6 A direction field and integral curves for

$$y' = \frac{x^2}{1 - x^2 - y^2}$$

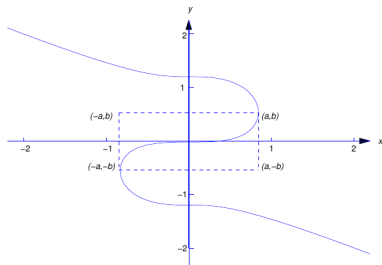


Figure 1.3.7

(William F. Trench *Elem. diff. equations*)