

Linearization of Non-Linear Systems

What can we say about these equilibrium solutions?

Linearization process:

Theorem 0.1. *Take an autonomous system of the form*

$$\begin{aligned}\frac{dx}{dt} &= F(x, y) \\ \frac{dy}{dt} &= G(x, y)\end{aligned}$$

and let (a, b) be an equilibrium solution of this system. The linearization of this system near (a, b) is the system

Example. Find the linearization of the system

$$\begin{aligned}\frac{dx}{dt} &= (x - 2)(y - 4) \\ \frac{dy}{dt} &= (x - y)(y + 3)\end{aligned}$$

around the critical point $(2,2)$