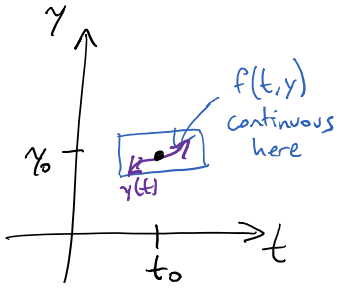
Existence and Uniqueness Theorem

Situation: $\frac{dy}{dt} = f(t,y)$ with $y(t_0) = y_0$

- Is there a solution?
- If so, is it unique?

Theorem:

- If $f(t,y)$ is continuous in a rectangle containing (t_0, y_0), then the initial-value problem has a solution. (Existence)



- If $f(t,y)$ and $\frac{\partial f}{\partial y}$ are both continuous in a rectangle containing (t_0, y_0), then the solution is unique in some interval around $t = t_0$. (Uniqueness)