

- A first-order differential equation $y' = f(x, y)$ asks for a curve whose slope at each point is prescribed. Typically there is a family of such curves.
- An initial value problem

$$y' = f(x, y), \quad y(x_0) = y_0, \quad (1)$$

singles out one solution curve by demanding that the curve pass through a specified point.

- A theorem says that if f is a reasonable function near the initial point (x_0, y_0) , then there is one and only one solution to the initial value problem (1) near (x_0, y_0) . (The precise meaning of “reasonable” in this context is that both f and the partial derivative $\partial f / \partial y$ are continuous functions near (x_0, y_0) .)
- Knowing that a solution exists is not the same as finding the solution! A solution might be presented
 - explicitly, in the form $y = g(x)$;
 - implicitly, via an equation of the form $G(x, y) = \text{constant}$;
 - graphically, by using the direction field to sketch a solution curve;
 - as a table of values computed by a numerical scheme like Euler’s method.
- Maple has commands for solving differential equations.
 - `dsolve` attempts to find an explicit or implicit solution to a differential equation.
 - With the `numeric` option, `dsolve` finds an approximate numerical solution to an initial value problem.
 - `DEplot` can display a direction field and solution curves.