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Can a differential equation have non unique solutions ... Existence and Uniqueness of Solutions
Plugging in 3 into the limit gives the indeterminate answer of 0/0. Applying L'Hospital's Rule gives the limit of $1/g'(x) = 0$. So, the limit of $g'(x)$ as x approaches 3 is infinity. One solution would be to let $g(x)$ equal $\sqrt{x-3}$. Then, $f(x)$ will equal $1/\sqrt{x-3}$. Comment on KLaudano's post "Let $f(x) = 1/g(x)$."

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Existence and Uniqueness of Solutions

Then for each t in I there exists a unique solution $y = \phi(t)$

to the differential equation $\frac{dy}{dt} + p(t)y = g(t)$ that also satisfies the initial value condition that $y(t_0) = y_0$. Proof: Let $p = p(t)$ and $g = g(t)$ be continuous on $I = (\alpha, \beta)$ and let $t_0 \in (\alpha, \beta)$.

Existence/Uniqueness of Solutions to First Order Linear ...

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Picard-Lindelöf theorem - Wikipedia

First, it tells us that for nice enough linear first order differential equations solutions are guaranteed to exist and more importantly the solution will be unique. We may not be able to find the solution but do know that it exists and that there will only be one of them. This is the very important aspect of this theorem.

Differential Equations - Intervals of Validity

Question: 9. (6 Points) Find The Unique Solution To The System Of Differential Equations Subject To The Given Initial Conditions. $3 \ 4 \ X = x - 1 \ 3$, Subject To $X_1(0) = 2$ & $X_2(0) = -1$

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Differential Equations - Final Thoughts

Although it is possible for a de to have a unique solution, e.g., $y = 0$ is the solution to $(y_0)^2 + y^2 = 0$, or no solution at all, e.g., $(y_0)^2 + y = -1$ has no solution, most de's have infinitely many solutions. Example 1.3. The function $y = \sqrt{4x+C}$ on domain $(-C/4, \infty)$ is a solution of $yy' = 2$ for any constant C . *

Differential Equations I

Definition. An initial value problem is a differential equation $' = (, ())$ with $: c \ x \rightarrow$ where is an open set of x , together with a point in the domain of $(, ()) \in$, called the initial condition.. A solution to an initial value problem is a function that is a solution to the differential equation and satisfies $=$. In higher dimensions, the differential equation is replaced with a family of ...

Initial value problem - Wikipedia

Enter an equation (and, optionally, the initial conditions): For example, $y''(x)+25y(x)=0, y(0)=1, y'(0)=2$. Write $'y'(x)$ instead of $'(dy)/(dx)$, $'y''(x)$ instead of $'(d^2y)/(dx^2)$, etc.

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Existence and Uniqueness of Solutions (Differential ...

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Ordinary Differential Equations Calculator - Symbolab

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Verifying solutions to differential equations (video ...

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$2 | x |, x(0) = 0$ and you usually discuss uniqueness for initial value problems, as otherwise uniqueness will almost never hold ($x' = 0$ has all constants as solutions). share.

Can a differential equation have non unique solutions ...

Pure mathematics focuses on the existence and uniqueness of solutions, while applied mathematics emphasizes the rigorous justification of the methods for approximating solutions. Differential equations play an important role in modeling virtually every physical, technical, or biological process, from celestial motion, to bridge design, to interactions between neurons.

Differential equation - Wikipedia

Let's look at an example of verifying that a unique solution to a higher order linear differential equation exists. Example 1 Show that there exists a unique solution to the third order linear differential equation $\frac{d^3y}{dt^3} + 3 \frac{d^2y}{dt^2} + \sin t \frac{dy}{dt} + e^t y = 0$ with the initial conditions $y(1) = 1$, $y'(1) = 1$, $y''(1) = 2$.

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Find the Interval That a Linear First Order Differential ...

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Solving of differential equations online for free

Degree of Differential Equation. The degree of the differential equation is the power of the highest order derivative, where the original equation is represented in the form of a polynomial equation in derivatives such as y', y'', y''' , and so on.. Suppose $(d^2 y/dx^2) + 2(dy/dx) + y = 0$ is a differential equation, so the degree of this equation here is 1.

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[Initial value problem - Wikipedia](#)

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