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learn differential equations differential equations separable equations exact equations integrating factors and homogeneous equations and more in biology and economics differential equations are used to model the behavior of complex systems the mathematical theory of differential equations first developed together with the sciences where the equations had originated and where the results found application a differential equation is an equation involving an unknown function $y = f(x)$ and one or more of its derivatives a solution to a differential equation is a function $y = f(x)$ that satisfies the differential equation when f and its derivatives are substituted into the equation in this chapter we introduce the concept of differential equations a differential equation is an equation that provides a description of a function s derivative which means that it tells us the function s rate of change techniques for solving differential equations can take many different forms including direct solution use of graphs or computer calculations we introduce the main ideas in this chapter and describe them in a little more detail later in the course differential equations are equations that relate a function with one or more of its derivatives this means their solution is a function learn more in this video questions tips thanks want to join the conversation sort by top voted rappy3 10 years ago at 1:05 we see d^2y/dx^2 where is that x^2 coming from 56 votes upvote differential equations are the language in which the laws of nature are expressed understanding properties of solutions of differential equations is fundamental to much of contemporary science and engineering a differential equation is a mathematical equation that relates some function with its derivatives in applications the functions usually represent physical quantities the derivatives represent their rates of change and the differential equation defines a relationship between the two thumbnail slope field with select solutions gilbert strang explains differential equations and linear algebra which are two crucial subjects in science and engineering this video series develops those subjects both separately and together and supplements prof strang's textbook differential equations and linear algebra scientists and engineers must know how to model the world in terms of differential equations and how to solve those equations and interpret the solutions this course focuses on the equations and techniques most useful in science and engineering a differential equation is an equation involving

a function and its derivative or derivatives our goal is to find the function if one exists that satisfies the given differential equation for example $y = \sin x$ is a solution to the ordinary differential equation differential equations can describe how populations change how heat moves how springs vibrate how radioactive material decays and much more they are a very natural way to describe many things in the universe unit 1 integrals review unit 2 integration techniques unit 3 differential equations unit 4 applications of integrals unit 5 parametric equations polar coordinates and vector valued functions unit 6 course challenge test your knowledge of the skills in this course start course challenge math calculus 2 unit 3 differential equations chapter 1 first order equations the fundamental existence theorem approximation of solutions chapter summary exercises applications chapter 2 linear first order equations the solution of linear equations properties of solutions the method of undetermined coefficients autonomous linear equations chapter summary exercises definitions in this section some of the common definitions and concepts in a differential equations course are introduced including order linear vs nonlinear initial conditions initial value problem and interval of validity direction fields in this section we discuss direction fields and how to sketch them a differential equation is an equation with a function and one or more of its derivatives example an equation with the function y and its derivative dy/dx in our world things change and describing how they change often ends up as a differential equation in this section some of the common definitions and concepts in a differential equations course are introduced including order linear vs nonlinear initial conditions initial value problem and interval of validity first order differential equations in this chapter we will look at several of the standard solution methods for first order differential equations including linear separable exact and bernoulli differential equations we also take a look at intervals of validity equilibrium solutions and euler's method a differential equation is an equation that contains at least one derivative of an unknown function either an ordinary derivative or a partial derivative suppose the rate of change of a function y with respect to x is inversely proportional to y we express it as $dy/dx = k/y$ as the equations become more complicated the solution techniques also become more complicated and in fact an entire course could be dedicated to the study of these equations in this chapter we study several types of differential equations and their corresponding methods of solution

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