

1. CHAPTER 6 SECTION 3: DIFFERENTIAL EQUATIONS AND MOTION

Definition 1.1. A **differentiable equation** is an equation that involves an unknown function and one or more of its derivatives.

Definition 1.2. The **order** of a differentiable equation is the highest derivative in the equation

Definition 1.3. A **solution** for the differentiable equation is a function that satisfies the differentiable equation

Example 1.1. Suppose $\frac{dy}{dt} = 10 \sin t + 7 \cos t$, and $y(0) = 3$, find the solution of the initial value problem.

Example 1.2. Use that -9.8m/s^2 is the acceleration due to the force of gravity to find the equation for the height of an object dropped from a height of h_0 m. Assume no other force acts on the object (e.g. no air resistance). Suppose the object is thrown with an initial velocity v_0 rather than just dropped. How is the equation for height changed?

Example 1.3 (6.3 WP Homework Question 7, Text 23). *A 747 jet needs to attain a speed of 150 mph to take off. It can accelerate from 0 to 150 mph in 16 seconds, how long must the runway be, assuming acceleration is constant? Hint: We need to find $s(16) - s(0)$, where s is the position of the jet at time t in the interval $[0, 16]$.*