Intro Differential Equations M285 notes

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This note will collect key ingredients taught in class. It cannot be used as a substitute of your textbook.

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Chapter 1 Introduction

Example (an algebra equation)

$x^2 = 1$

Definition (Differential equations)

Differential equations are equations that contains derivative.

Application of differential equations: Differential equations are often used to model physical process.

Example (a differential equation)

Falling object with mass m and gravity g. Describe the motion of the object, if

i. gravity is the only force acting on the object;

ii. besides gravity, there is a force due to air friction. And, suppose the force is proportional to velocity with coefficient γ.

Qualitative description of diff- equations: Direction fields

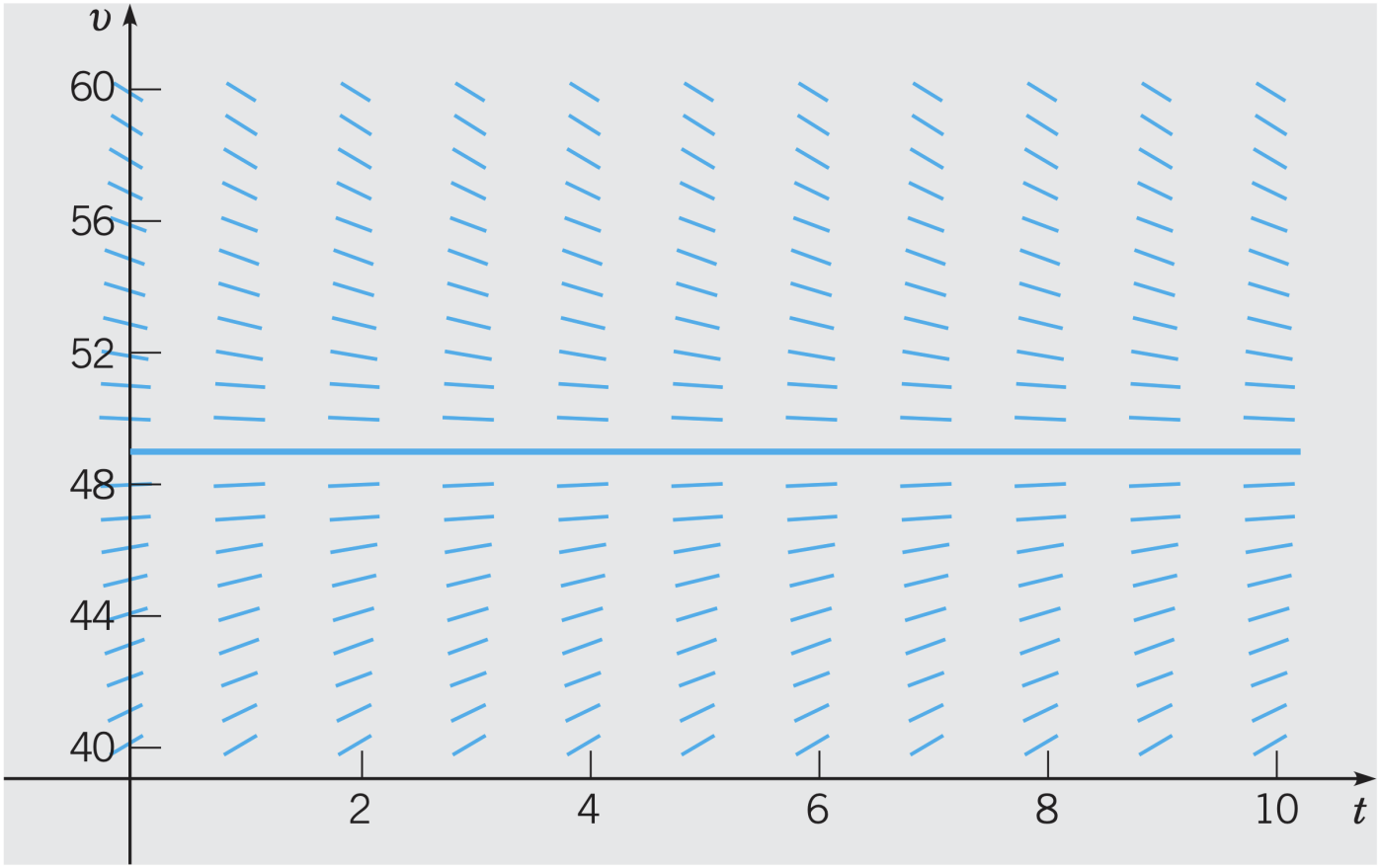

FIGURE 1.1.3 Direction field and equilibrium solution for Eq. (5): $dv/dt = 9.8 - (v/5)$.