Chapter 4

Higher Order Linear Equations

4.1 Some Basic Mathematical Models; Directional Fields

Equations containing derivatives are **differential equations**.
A differential equation that describes some physical process is a **mathematical model** of the process.
Direction Fields are valuable tools in studying the solutions of differential equations of the form

$$\frac{dy}{dt} = f(t, y)$$

where f is a given function of the two variables t and y, sometimes called the **rate function**.
To model population growth, an equation in the form

$$\frac{dp}{dt} = rp - k$$

may work, where r is the growth rate and k is the predation rate. The equilibrium solution for this equation is k/r.