Notes on Section 2.4.6
The Logistic Equation

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The differential equation

(1)

where each of k and M is a positive number is known as the
The equation has applications in mathematical biology. For example,
The number
and

Equation (1) is equivalent to

which is a Bernoulli differential equation. It is also equivalent to

(2)

which is separable. We will find the solutions to (1) by solving (2). Using partial fractions

on the left side of (2) we have

$$+ C$$

In the applications of interest it will be the case that $0 < y(t) < M$ so

so

Exponentiating and noting that the additive constant becomes a multiplicative one, so

If

where $0 < R < M$ then

Example. See the example on page 56 of the text.

Suggested Problems. Problems 1,3, and 5 in Exercises 2.4.6 on pages 56 and 57 of the text.