Numerical Analysis

EIGHTH EDITION

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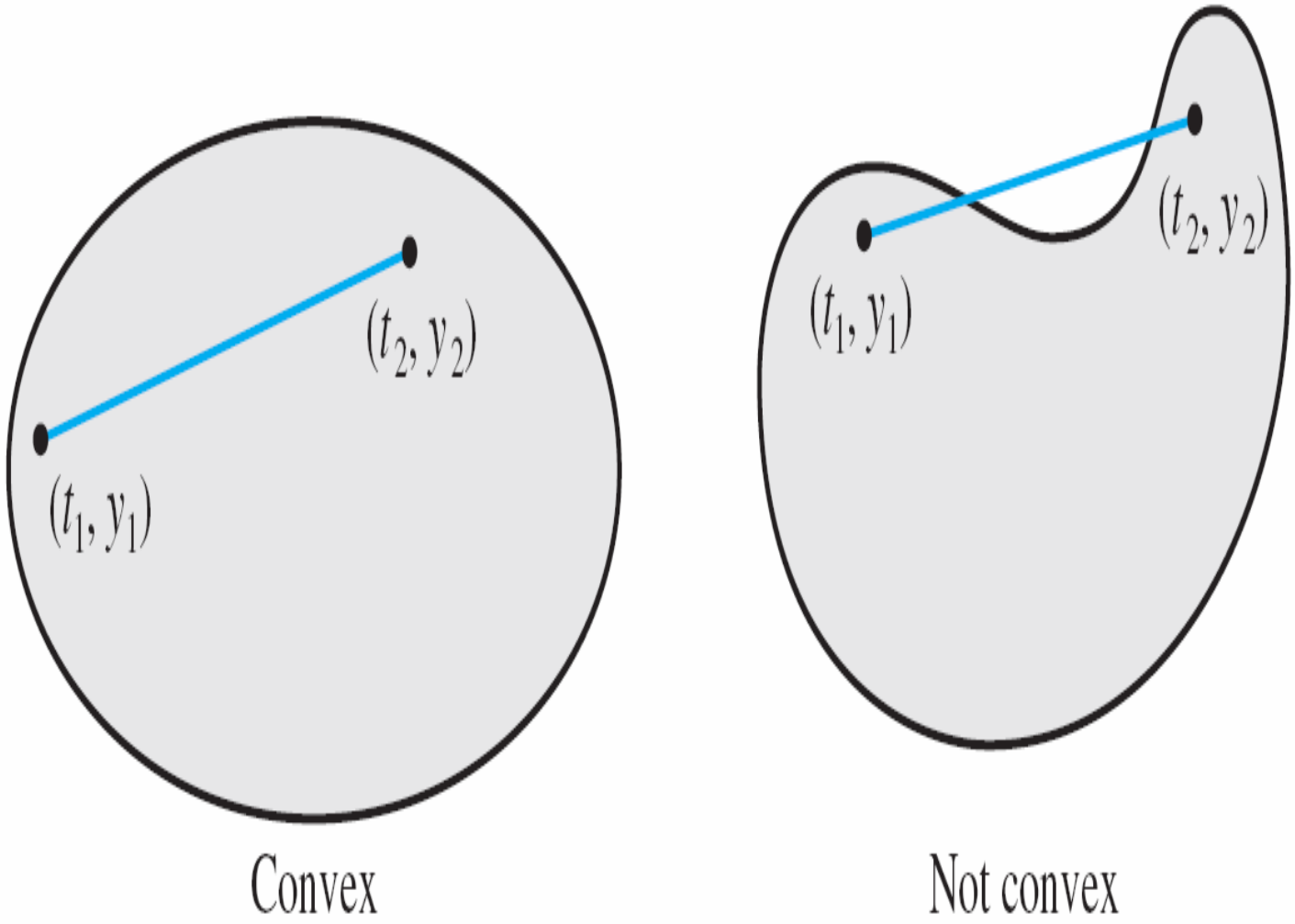
CHAPTER

5

Initial-Value Problems for Ordinary Differential Equations

Figure 5.1



5.2 Euler's Method

Figure 5.2

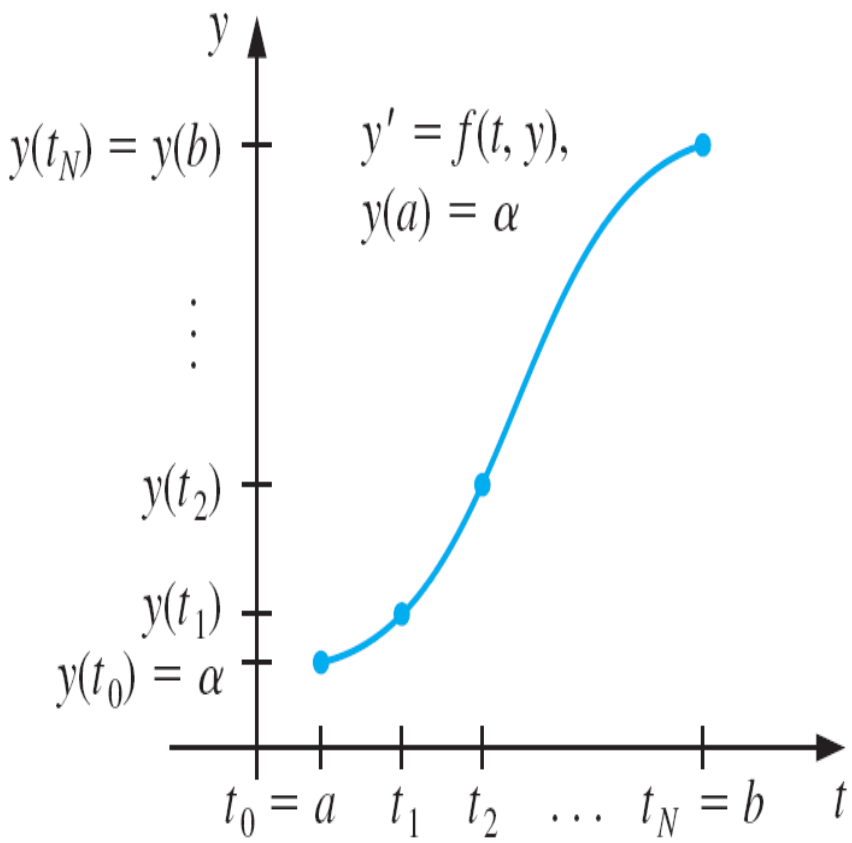
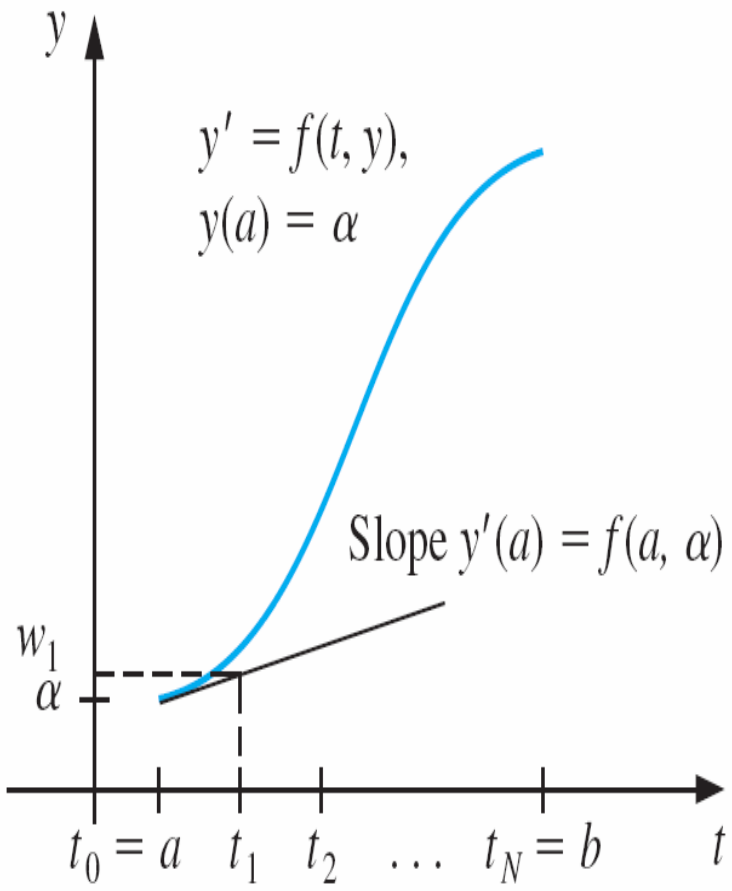


Figure 5.3


y
y′ = f(t, y),
y(a) = α
Slope y′(a) = f(a, α)
w1
α
t0 = a
t1
t2
. . .
tN = b
t
(a)

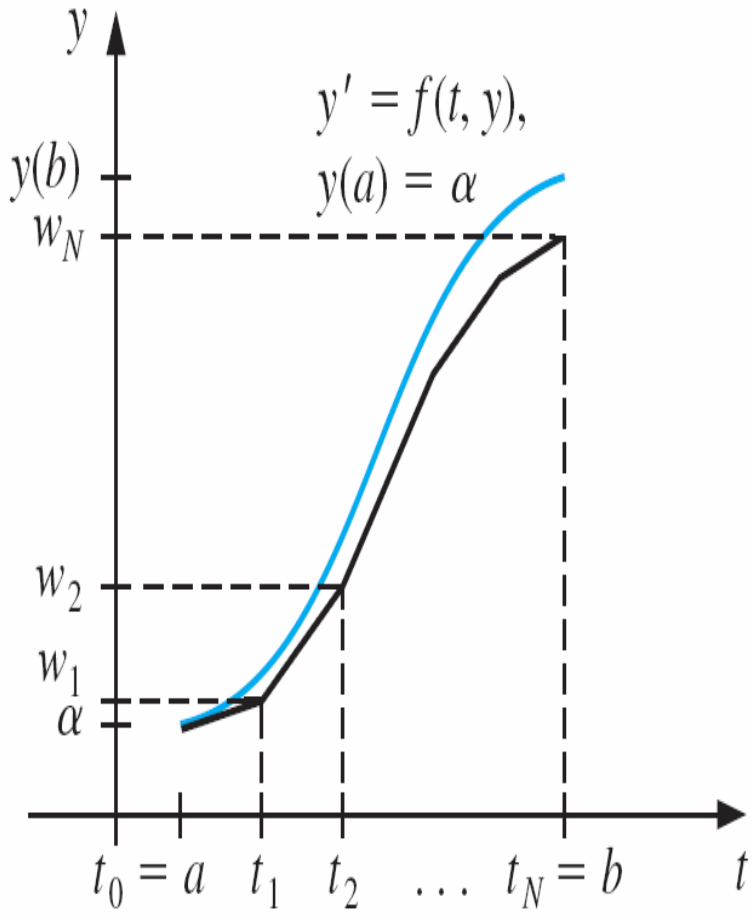
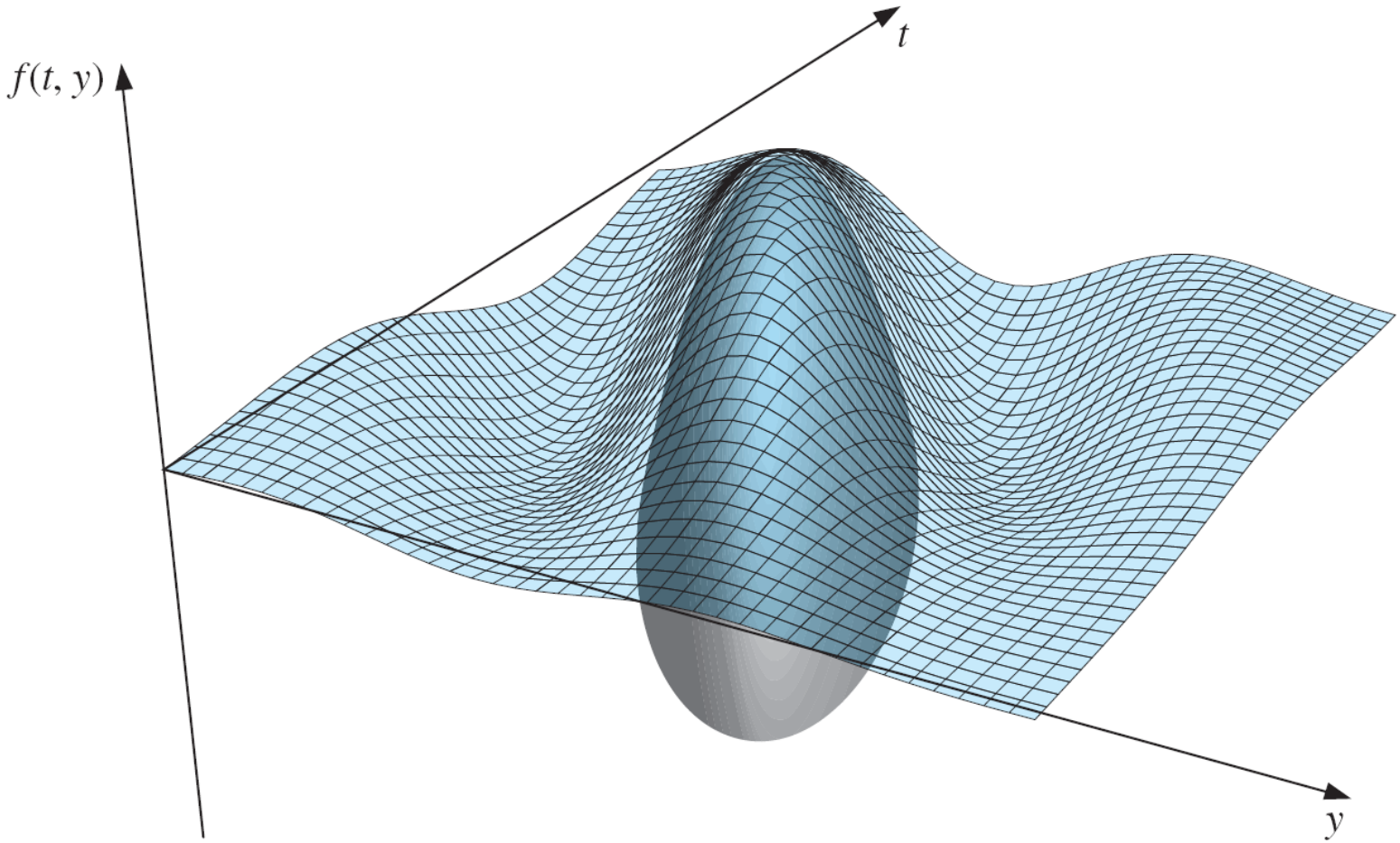

y
y′ = f(t, y),
y(a) = α
y(b)
wN
w2
w1
α
t0 = a
t1
t2
. . .
tN = b
t
(b)

Figure 5.4

$$f(t, y) = \exp\{-(t-2)^2/4 - (y-3)^2/4\} \cos(2t + y - 7)$$



$$P_2(t, y) = 1 - \frac{9}{4}(t-2)^2 - 2(t-2)(y-3) - \frac{3}{4}(y-3)^2$$

Figure 5.5

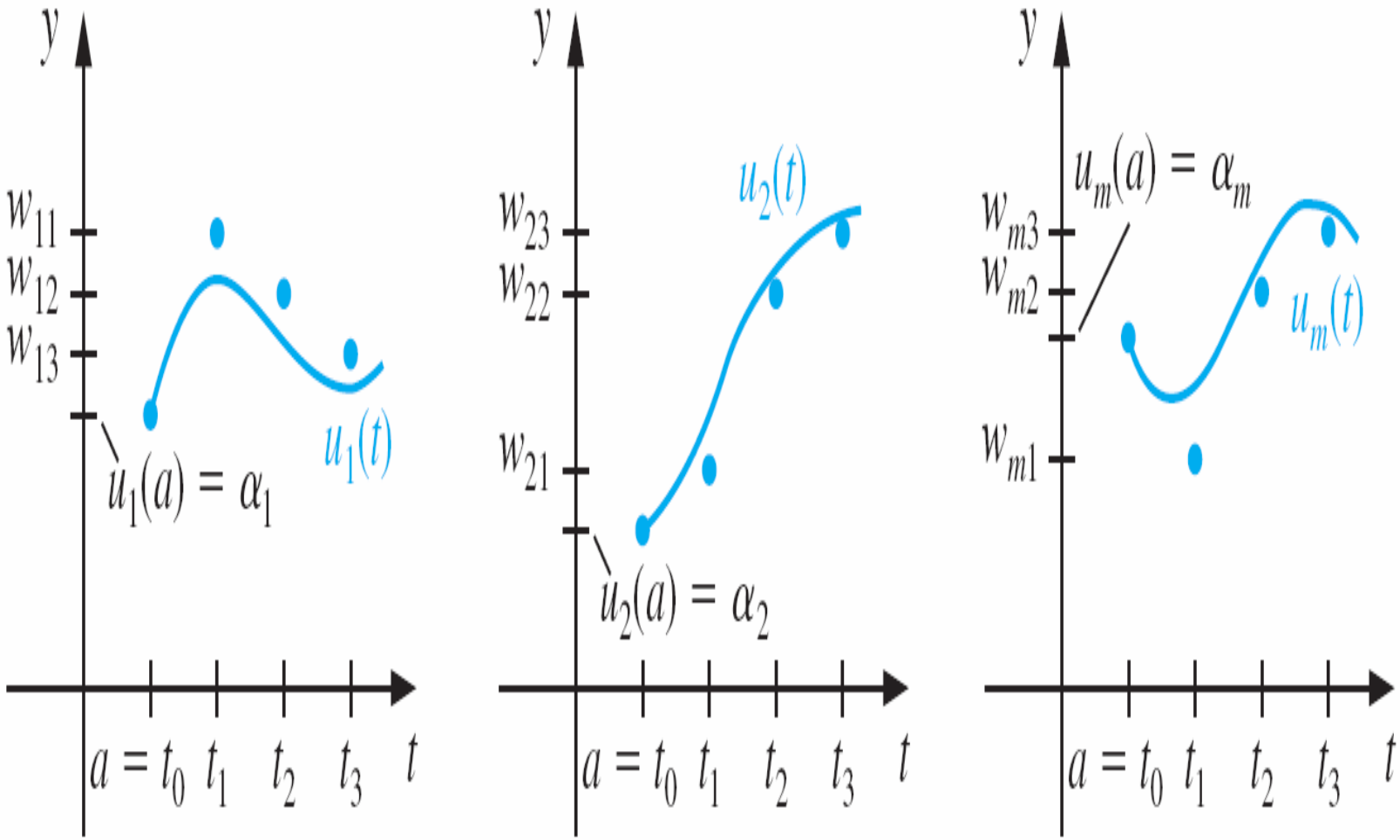

y
w_{11}
w_{12}
w_{13}
$u_1(a) = \alpha_1$
$u_1(t)$
$a = t_0$ t_1 t_2 t_3 t
y
w_{23}
w_{22}
w_{21}
$u_2(t)$
$u_2(a) = \alpha_2$
$a = t_0$ t_1 t_2 t_3 t
y
w_{m3}
w_{m2}
w_{m1}
$u_m(a) = \alpha_m$
$u_m(t)$
$a = t_0$ t_1 t_2 t_3 t

Figure 5.6