decays exponentially, depending on the sign of \( \lambda \) (unless \( \lambda = 0 \)). In Example 1 we have \( \lambda = -1/2 < 0 \), so solutions are decaying oscillations. The graph of a typical solution of Eq. (18) is shown in Figure 3.4.1. On the other hand, \( \lambda = 1/4 > 0 \) in Example 3, so solutions of the differential equation (22) are growing oscillations. The graph of the solution (24) of the given initial value problem is shown in Figure 3.4.2. The intermediate case is illustrated in Example 2 in which \( \lambda = 0 \). In this case the solution neither grows nor decays exponentially, but oscillates steadily; a typical solution of Eq. (20) is shown in Figure 3.4.3.

FIGURE 3.4.1 A typical solution of \( y'' + y' + y = 0 \).

FIGURE 3.4.2 Solution of \( 16y'' - 8y' + 145y = 0 \), \( y(0) = -2 \), \( y'(0) = 1 \).