The following problems are from the 7th Edition of Boyce and DiPrima. They are from Section 3.1, Exercises 28, 30.

For problems 28 and 30, use the following method:

Equations with the Dependent Variable Missing. For a second order differential equation of the form $y'' = f(t, y')$, the substitution $v = y', v' = y''$ leads to a first order equation of the form $v' = f(t, v)$. If this equation can be solved for v, then y can be obtained by integrating $dy/dt = v$. Note that one arbitrary constant is obtained in solving the first order equation for v, and a second is introduced in the integration for y. In each of Problems 28 through 33 use this substitution to solve the given equation.

28. $t^2y'' + 2ty' - 1 = 0, \quad t > 0$

30. $y'' + t(y')^2 = 0.$