For certain 2nd order differential equations, the substitution $u = y'$ will reduce the the equation to a solvable 1st order equation.

For equations of the form

$$F(x, y', y'') = 0,$$

use the substitutions

$$y' = u \qquad y'' = u'$$

For equations of the form

$$F(y, y', y'') = 0,$$

use the substitutions

$$y' = u \qquad y'' = u\,\frac{du}{dy}$$