Types of Second Order Equations

A second order equation is one where the highest derivative that shows up in the equation is the second derivative. This means that the most general second order equation is of the form

$$y'' = f(t, y, y')$$

where this f can be any function of 3 variables.

For this reason, we want to restrict the types of equations we consider and try to solve.

These are in increasing order of what we can solve. We can solve all constant-coefficient homogeneous equations, and a lot of constant-coefficient non-homogeneous equations. Beyond that, there isn't too much hope.