

[gex108] **Second-order ODE: reduction to first order ODE I**

Consider the 2<sup>nd</sup>-order ODE for the function  $y(x)$ ,

$$y'' + xy'^2 = 0,$$

which is amenable to a reduction into a 1<sup>st</sup>-order ODE for the variable  $z(x) = y'(x)$ .

- (a) State the 1<sup>st</sup>-order ODE for  $z(x)$  and solve it via the DSolve command of Mathematica.
- (b) Use the Integrate command to find  $y(x)$  from  $z(x)$ .
- (c) Apply the DSolve command to the original 2<sup>nd</sup>-order ODE and show that the results are equivalent. Keep track of the integration constants in all operations.

**Solution:**