

### 13. Reduction of order (section 3.4 continued)

1. Consider second order linear homogeneous equation with arbitrary coefficients:

$$y'' + p(t)y' + q(t)y = 0.$$

Assume that we already know one of its particular solutions,  $y_1(t)$ . How to find another solution to get a fundamental set?

**Step 1.** Look for a second solution in the form

$$y(t) = v(t)y_1(t).$$

**Step 2.** Set  $v' = w$  to reduce order and solve obtained first order linear homogeneous ODE.

2. Note that the method can be also applied to linear nonhomogeneous ODE

$$y'' + p(t)y' + q(t)y = g(t).$$

3. Use the method reduction of order to find a second particular solution of

$$t^2y'' + 2ty' - 2y = 0$$

if  $y_1(t) = t$ .