

Linear ODE:

$$a_n(t) y^{(n)}(t) + a_{n-1}(t) y^{(n-1)}(t) + \dots + a_1(t) y'(t) + a_0(t) y(t) = g(t)$$

- Can't have $y^2, \sin(y), e^y$, etc. or $y \cdot y', y' \cdot y''$

- Can have $t^2 y, \sin(t) y$, etc.

$t y' - y = t^2$ is $y(t) = 3t + t^2$ a soln

$$t(3+2t) - 3t + t^2 = t^2 \quad y'(t) = 3+2t$$

$$3t + 2t^2 - 3t + t^2 = t^2$$

$t^2 = t^2 \rightarrow$ yes its a solution