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1. Solve the Euler's equation

$$t^2 y'' - t y' + y = 0, t > 0$$

2. Knowing that $y_1(t) = e^{-t}$ is a solution to the homogeneous ODE

$$(t+1)y'' + ty' - y = 0,$$

find the general solution. Hint: The ODE of $v(t)$ appearing in $y_2(t) = v(t)y_1(t)$ is

$$v''(t)y_1(t) + v'(t)(2y_1'(t) + p(t)v(t))$$

where $p(t)$ is the coefficient of y' in the standard form of the ODE.