

Find the general solution to each of the following differential equations.

1. $y''' - 3y'' + 2y' = 0$

The characteristic equation is $r^3 - 3r^2 + 2r = r(r-2)(r-1) = 0$, so the general solution is

$$y = c_1 + c_2e^t + c_3e^{2t}.$$

2. $y''' - 3y'' + 2y' = -1$

Our guess for a particular solution will be $y_p = at$. Then $y'_p = a$ and $y''_p = 0$, so $2a = -1$. Therefore $y_p = -\frac{t}{2}$, so the general solution is

$$y = -\frac{t}{2} + c_1 + c_2e^t + c_3e^{2t}.$$