
An eleventh order homogeneous linear equation.

Find the general solution of the following differential equation

$$y^{(11)} + 9y^{(10)} + 13y^{(9)} - 85y^{(8)} - 339y^{(7)} - 585y^{(6)} + 107y^{(5)} + 4413y^{(4)} + 10106y''' + 14680y'' + 480y' - 28800y = 0.$$

You may use the fact that the auxiliary equation

$$m^{11} + 9m^{10} + 13m^9 - 85m^8 - 339m^7 - 585m^6 + 107m^5 + 4413m^4 + 10106m^3 + 14680m^2 + 480m - 28800 = 0$$

factors into

$$(m - 1)(m + 2)(m^2 + 5)(m^2 + 2m + 5)(m - 3)^2(m + 4)^3 = 0.$$