

Discovery Exercise for the Method of Frobenius

A “generalized power series” is a function in the following form, where r is any constant.

$$y = x^r(c_0 + c_1x + c_2x^2 + c_3x^3 + \dots) = c_0x^r + c_1x^{r+1} + c_2x^{r+2} + c_3x^{r+3} + \dots$$

1. Based on this form, find y' and y'' .
2. Plug the given y , y' , and y'' into the differential equation $x^2y'' + 8xy' + 12y = 0$.
3. Set the coefficients of x^r on the left and right sides of your equation equal to each other, and solve the resulting equation for r .

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