18.03–ESG Exam 2

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Find the general solutions to the following differential equations.

1. $y^{(3)} - y = e^x + 7$ (Use undetermined coefficients.)

2. $x^2 y'' + xy' - y = \ln x$ (Use variation of parameters.)

Use series methods to start solving the following equations, but stop after you obtain a recurrence relation for the coefficients.

3. $y' + 2xy = 0$ (Power series)

4. $2xy'' + 3y' - y = 0$ (Frobenius series—One of the values of r is an integer, and the other is not. Find only the recurrence relation for the series associated with the *noninteger* value of r.)

5. Given the equation $y'' + \frac{p(x)}{x}y' + \frac{q(x)}{x^2}y = 0$, what does it mean to say that 0 is a "regular singular point" of the equation?