

A Simple Solution to Euler-Cauchy Problems with Polynomial Right-Hand Sides

Doreen De Leon

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Abstract

The nonhomogeneous Euler-Cauchy equation, one of the first higher order differential equations with variable coefficients introduced in an undergraduate differential equations course, presents some surprising results when the right-hand side function is the product of a constant and a power of t . It turns out that a particular solution to such an equation is either a monomial of the same degree as the right-hand side function or the product of such a monomial and a power of $\ln(t)$. As a result, we can determine a particular solution when the right-hand side function is a polynomial of any degree without using variation of parameters or transforming the equation to a constant-coefficient equation and then applying the method of undetermined coefficients.