Lecture 3.7: Cauchy-Euler equations

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Math 2080, Differential Equations

Cauchy-Euler equations

Example 1

Consider the following homogeneous ODE: $x^2y'' + xy' - y = 0$. Solve for $y(x)$.

Cauchy-Euler: complex roots

Example 2

Consider the following homogeneous ODE: $x^2y'' + xy' + y = 0$. Solve for $y(x)$.

Cauchy-Euler: repeated roots

Example 3

Consider the following homogeneous ODE: $x^2y'' + 3xy' + y = 0$. Solve for $y(x)$.

An alternative approach: letting $t = \ln x$

Example 3 (revisited)

Consider the following homogeneous ODE: $x^2y'' + 3xy' + y = 0$. Solve for $y(x)$.