Math 334 Fall 2011 Homework 5

Basic

Intermediate

Problem 1. Solve the following equations.

a) $y'' + y = \csc^3 x$.

b) $y'' - 2\,y' + y = x^{-1}\,e^x$.

Advanced

Problem 2. Solve the following equations.

a) $y''' + 4\,y'' + y' - 6\,y = 0$

b) $y^{(4)} - 13\,y^{(2)} + 36\,y = 0$.

c) $y^{(5)} - y = 0$.

d) $y^{(7)} - 3\,y^{(6)} + 4\,y^{(5)} - 4\,y^{(4)} + 3\,y^{(3)} - y^{(2)} = 0$.

Challenge

Answers

- Problem 1.

  a) $y = C_1 \cos x + C_2 \sin x + \frac{1}{2 \sin x}$.

  b) $y = C_1 e^x + C_2 x e^x + x e^x \ln|x|$.

- Problem 2.

  a) $y = C_1 e^t + C_2 e^{-2t} + C_3 e^{-3t}$.

  b) $y = C_1 e^{3t} + C_2 e^{-3t} + C_3 e^{2t} + C_4 e^{-2t}$.

  c) $y = C_1 e^x + C_2 e^{\left(\cos\frac{2}{5}\pi\right)t} \cos\left(\sin\frac{2\pi}{5} t\right) + C_3 e^{\left(\cos\frac{2}{5}\pi\right)t} \sin\left(\sin\frac{2\pi}{5} t\right) + C_4 e^{\left(\cos\frac{4}{5}\pi\right)t} \cos\left(\sin\frac{4\pi}{5} t\right) + C_5 e^{\left(\cos\frac{4}{5}\pi\right)t} \cos\left(\sin\frac{4\pi}{5} t\right)$.

  d) $y = C_1 + C_2 t + C_3 e^t + C_4 t e^t + C_5 t^2 e^t + C_6 \cos t + C_7 \sin t$.