

27 March 2008
Math 242

Homework 10

Directions: Please work these problems for homework. They will be due on Thursday, April 3.

1. Solve the following Cauchy-Euler equations and IVPs:

(a) $25x^2y'' + 25xy' + y = 0$

(b) $x^2y'' + 5xy' + 4y = 0$

(c) $x^3y''' - 2x^2y'' - 2xy' + 8y = 0$

(d) $x^2y'' - 3xy' + 4y = 0; y(1) = 5, y'(1) = 3$

(e) $x^2y'' - 2xy' + 2y = x^3 \ln x$

2. Solve $x^2y'' + (y')^2 = 0$

3. Compute the Laplace transform of the following functions using the definition.

(a) $f(t)$ where

$$f(t) := \begin{cases} 2e^{-t} & 0 \leq t < 2 \\ t^2 + 1 & t \geq 2 \end{cases}$$

(b) $f(t) := \cos(kt)$ for any real k .

4. Compute the Laplace transform of the following functions using the formulas and rules from class.

(a) $f(t) = e^{-3t} \sin^2(2t)$

(b) $f(t) = \sinh(kt)$ for any real k where $\sinh t := \frac{1}{2}(e^t - e^{-t})$.

(c) $f(t) = t^2 H(t - 3)$