

Math 211-003: Assignment 7

Due 10/30/2008

These problems are due with work shown by the beginning of class.

#1) Solve: $y'' + 3y' - 4y = e^t$, $y(0) = 1$, $y'(0) = 1$

#2) Solve: $y'' - y = te^{-t} + e^t$, $y(0) = 0$, $y'(0) = -3$

#3) Find (for constant $c > 0$) $\mathcal{L}\{H(t-c)t\}(s)$

#4) Solve:

$$y'' + y = f, \quad y(0) = 1, y'(0) = 0$$

where

$$f(t) = \begin{cases} 0 & 0 \leq t < 1 \\ t & 1 \leq t \end{cases}$$

#5) Find

$$\mathcal{L}^{-1} \left\{ \frac{1}{s^2} + \frac{se^{-2s}}{s^2 + 9} \right\} (t)$$

#6) Suppose $F(s) = \mathcal{L}\{f\}(s)$ for some continuous function f . Suppose also that g is a differentiable function such that $g' = f$ for all $t > 0$, $g(0) = 0$, and $G(s) = \mathcal{L}\{g\}(s)$. Show that:

$$G(s) = \frac{F(s)}{s}$$

#7) Find

$$\mathcal{L}^{-1} \left\{ \frac{3+s}{s(s-2)} \right\} (t)$$

#8) Find

$$\mathcal{L}^{-1} \left\{ \frac{1}{s(s^2+1)} \right\} (t)$$

#9) Find

$$\mathcal{L}^{-1} \left\{ \frac{s}{(s^2+1)^2} \right\} (t)$$

Reminder: $2 \sin A \cos B = \sin(A+B) + \sin(A-B)$

#10) Solve the following IVP:

$$y'' + y = \cos t + 2, \quad \text{for } y(0) = 0, y'(0) = 1$$