Math 231.04, Problem Set 10

Due Wednesday, March 31, 2010

From Text Fundamentals of Differential Equations, by Nagle, Saff, and Snider

Section 5.2, # 1, 13, 19

Section 7.2, # 1, 3, 5, 7, 9, 13, 15, 17, 19 (On #5 and #7, you can use the formula on the inside front cover of your text for \( \int e^{au} \cos nu \, du \).)

Additional Problems:

1.) Solve the initial value system

\[ x' = 4x + y \quad ; \quad x(0) = 3, \]
\[ y' = -x + 2y \quad ; \quad y(0) = 1. \]

2.) Solve the system

\[ x' = 4x + y, \]
\[ y' + x' = -x + y. \]

3.) Let \( f(t) = \begin{cases} t^2, & 0 < t < 3 \\ 0, & t > 3 \end{cases} \). Calculate \( \mathcal{L}f(s) \), the Laplace transform of \( f \).

4.) Let \( f(t) = \begin{cases} e^t, & 0 < t < 2 \\ t, & t > 2 \end{cases} \). Calculate \( \mathcal{L}f(s) \), the Laplace transform of \( f \).

5.) Use Table 7.1 on p. 384 of your text and the linearity properties of the Laplace transform to compute the Laplace transform of the function

\[ f(t) = 6 + 3t^2 - 2 \cos 5t + 3e^{2t} \sin 4t. \]