MATH 319, Fall 2013, Assignment 9

Textbook Questions

Section 6.1, **#6** Find the Laplace transform of $f(t) = \cos at$, where a is a real constant.

#15 Use integration by parts to find the Laplace transform of the given function; n is a positive integer and a is a real constant:

$$f(t) = te^{at}$$

Section 6.2, **#7** Find the inverse Laplace transform of the given function:

$$F(s) = \frac{2s+1}{s^2 - 2s + 2}$$

#14 Use the Laplace transform to solve the given initial value problem:

$$y'' - 4y' + 4y = 0; \quad y(0) = 1,\ y'(0) = 1$$

#23 Use the Laplace transform to solve the given initial value problem:

$$y'' + 2y' + y = 4e^{-t}; \quad y(0) = 2,\ y'(0) = -1$$

Section 6.3, **#8** Sketch the graph of the following piece-wise defined function and then write $f(t)$ in terms of the unit step function $u_c(t)$:

$$f(t) = \begin{cases} 1, & 0 \le t < 1 \\ -1, & 1 \le t < 2 \\ 1, & 2 \le t < 3 \\ -1, & 3 \le t < 4, \\ 0, & t \ge 4 \end{cases}$$

#17 Find the Laplace transform of the following function:

$$f(t) = (t-3)u_2(t) - (t-2)u_3(t)$$

#20 Find the inverse Laplace transform of the following function:

$$F(s) = \frac{e^{-2s}}{s^2 + s - 2}$$

Section 6.4, #5(a) Find the solution of the following initial value problem:

$$y'' + 3y' + 2y = f(t); \quad y(0) = 0,\ y'(0) = 0$$

$$f(t) = \begin{cases} 1, & 0 \le t < 10 \\ 0, & t \ge 10 \end{cases}$$

#9(a) Find the solution of the following initial value problem:

$$y'' + y = g(t); \quad y(0) = 0,\ y'(0) = 1$$

$$g(t) = \begin{cases} t/2, & 0 \le t < 6 \\ 3, & t \ge 6 \end{cases}$$