

Problem Set Number 1

Due. Wednesday, September 19, 2007.

1. Find the LT of each of these signals defined on $(t > 0^-)$:

(a) te^{-2t}

(b) $f(t) = 1$ on $t \in [0, 1)$, $f(t) = 0$ elsewhere.

(c) $e^{(t-2)}$ (defined on $t > 1^-$)

2. Find $x(t)$ if the LT of x is given by

(a) $\frac{15(s+1)}{(s+2)(s-1)}$

(b) $\frac{2s^2 + 9s + 9}{(s+2)^2(s+1)}$

(c) $\frac{3s}{(s^2+4)(s^2+1)}$

3. Use Laplace transform methods to find solutions to y in the following first order equations:

(a) $\dot{y} + 2y = 5 \sin t$, with $y(0^-) = 0$;

(b) $\dot{y} = t \cos t$, with $y(0^-) = 0$. (Hint, write the $\cos(t)$ as a complex exponential.)

4. Using Laplace transforms, find the solution to the differential equation

$$\ddot{x} = 2e^{-t} \sin t, \quad t \geq 0$$

with zero initial conditions.