

CITY UNIVERSITY OF HONG KONG  
Department of Electronic Engineering

**EE 3210    Signals and Systems**

Homework #7

1. Find the Laplace transform of
  - (i)  $f_1(t) = te^{-3t}u(t)$ . (Hint: Use differentiation in frequency property)
  - (ii)  $f_3(t) = \cos 2\omega t \cos 3\omega t u(t)$  (Hint: Use trigonometric identity).
2. Find the inverse Laplace transform of
  - (i)  $F_1(s) = 1/s(s^2 + 2s + 2)$ .
  - (ii)  $F_2(s) = 5(s + 2)/s^2(s + 1)(s + 3)$ .Additionally, find the initial and final values of the corresponding time functions if they exist.
3. Consider the differential equation

$$2y''(t) + 2y'(t) + y(t) = u(t).$$

Find the transfer function for this system. In addition, assume that the initial conditions are given as  $y(0) = 0$ ,  $y'(0) = 2$ . Find the zero-state and zero-input responses. What is the solution of the differential equation?

4. Problem 9.17, pp. 723. Find also the transfer function of the system (Hint: Carry out block diagram to find the transfer function first).
5. Problem 9.35, pp. 729. Find the transfer function of the system, but discard the question on stability.